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SUPPLEMENT TO DRAFT ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

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Prepared For:

County of San Bernardino
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United States Department of the Interior
Bureau of Land Management

December 1993

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PLANNING DEPARTMENT

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL MANAGEMENT GROUP

385 North Arrowhead Avenue • San Bernardino, CA 92415-0182 • (909) 387-4099
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Valery Pilmer
Director of Planning

December 01, 1993

RESPONSIBLE AND TRUSTEE AGENCIES
INTERESTED ORGANIZATIONS AND INDIVIDUALS

RE: NOTICE OF AVAILABILITY OF THE DRAFT EIR/EIS SUPPLEMENT FOR THE RAIL-CYCLE BOLO STATION LANDFILL PROPOSAL

Dear Reader/Reviewer:

Enclosed for your review and comment is the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) Supplement for the Bolo Station Landfill proposed by the Rail-Cycle Corporation. The proposal includes the siting of a Class III municipal solid waste facility on 4,800 acres located adjacent to Bristol Dry Lake approximately 3 miles southeast of the community of Amboy.

The Draft EIR/EIS was previously distributed for public review to interested individuals, local organizations and agencies, and public libraries. The comment period ended on March 03, 1993.

The purpose of the Draft Supplement document is to clarify or revise information regarding several environmental issues and minor changes to the project design that have occurred since circulation of the Draft EIR/EIS. Additional information is provided on the issues as follows:

1. Project description;
2. Geology and soils;
3. Surface and ground water hydrology;
4. Air quality, and;
5. Noise.

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The document has been prepared to meet the State requirements of the California Environmental Quality Act and the Federal requirements of the National Environmental Policy Act. The Draft Supplement has been prepared by Environmental Solutions, Inc., an independent environmental consultant under the supervision of the County of San Bernardino and the U.S. Department of the Interior, Bureau of Land Management.

HARRY M. MAYS
County Administrative Officer
ALBERT R. REID
Assistant Administrative Officer
Environmental Management Group

Board of Supervisors
MARSHA TUROCI . . . . . First District
JON D. MIKELS . . . . . Second District
JERRY EAVES . . . . . Fifth District
BARBARA CRAM RIORDAN . . . . Third District
LARRY WALKER . . . . . Fourth District

The Supplement is being distributed for a 60 day comment period. The public comment period will end on February 21, 1994. Written comments should be sent to the address as follows:

County of San Bernardino
Planning Department
385 North Arrowhead, 3rd Floor
San Bernardino, CA 91425-0182
Attn: Mr. Randy Scott

Sincerely,

RANDY SCOTT, Senior Planner
Environmental Team, Planning Department
San Bernardino County

HENRI R. BISON, District Manager
Bureau of Land Management
U.S. Department of the Interior

COVER SHEET

SUPPLEMENT
TO
DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT
RAIL•CYCLE - BOLO STATION LANDFILL
SAN BERNARDINO COUNTY, CALIFORNIA

LEAD AGENCIES:

- San Bernardino County Planning Department
  San Bernardino, California
- U.S. Department of the Interior
  Bureau of Land Management
  Riverside, California

PROPOSED ACTION:

Construction and operation of the Rail•Cycle - Bolo Station Landfill, amendment of the County General Plan and the California Desert Conservation Area Plan, and issuance of associated right-of-way grants, land exchange, and permits.

Comments should be submitted to the County of San Bernardino at the address given below. For further information, contact the County or Bureau of Land Management at:

County of San Bernardino
Planning Department
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, California 92415-0182
(909) 387-4099
Attention: Mr. Randy Scott

Bureau of Land Management
California Desert District
6221 Box Springs Boulevard
Riverside, California 92507-0714
(909) 697-5230
Attention: Mr. Doug Romoli

DESIGNATION:

Supplement to Draft Environmental Impact Report/Environmental Impact Statement

ABSTRACT:

In August 1991, the County of San Bernardino (County) issued a Notice of Preparation of an Environmental Impact Report (EIR) in response to an application submitted by Rail•Cycle for construction of a Class III municipal solid waste facility near Amboy, California, in the eastern Mojave Desert region of San Bernardino County. The U.S. Bureau of Land Management (BLM) determined that an Environmental Impact Statement (EIS) would be required as the proposed action includes the exchange of federal lands managed by the BLM, an amendment of the California Desert Conservation Area Plan, and right-of-ways across federal lands. The BLM issues a Notice of Intent to prepare an EIS for the proposed action in August 1991. In accordance with the California Environmental Quality Act and National Environmental Policy Act, the County and BLM are preparing a joint EIR/EIS.

The proposed action is a private venture (Rail•Cycle) between Atchison, Topeka, and Santa Fe Railway Company, Inc. (ATSF) and Waste Management of North American, Inc. involving construction and operation of a Class III nonhazardous waste landfill that would accommodate up to 21,000 tons per day. Waste would be transported by rail from various counties and cities in southern California in sealed 40- to 45-foot containers (using existing rail lines) to the proposed Bolo Station Landfill.

Alternatives to the proposed Bolo Station Landfill include:

- Cadiz Valley Alternative
- Reduced Action Alternative
- No Action Alternative

Additional alternative sites for the proposed landfill were considered, but eliminated from further analysis, as they were determined not to be feasible for one or more of the following reasons:

- Not located on a major rail line or located on rail lines with steep grades.
- Located too far from Los Angeles County.
- Currently being considered for other proposed projects.
- Located in desert tortoise habitat.
- Site was considered too small to accommodate a 21,000-ton per day operation.
- Close proximity to populated areas.
- Topographical or geologic features which made siting of a landfill inappropriate.
- Jurisdictional boundaries (i.e., Department of Defense lands).

In November 1992, the Draft EIR/EIS for the Rail•Cycle - Bolo Station Landfill was distributed to agencies, organizations, and individuals for a 90-day review and comment period (December 4, 1992, to March 3, 1993). During the review and comment period, BLM held three public hearings to obtain verbal comments on the Draft EIR/EIS. The public hearings were held on February 8, 10, and 11, 1993, in the cities of Barstow, Twentynine Palms, and San Bernardino, California, respectively. In addition to verbal comments received during the public hearings, the County and BLM received approximately 90 letters from agencies, organizations, and individuals providing written comments on the Draft EIR/EIS.

Since circulation of the Draft EIR/EIS, revised or clarified information was developed to respond to public comments on the Draft EIR/EIS regarding several environmental issues. To respond to various issues regarding potential environmental effects of the proposed action that were not fully addressed in the Draft EIR/EIS, the County and BLM decided that a Supplement to the Draft EIR/EIS would be prepared. The Supplement provides additional analysis/clarification of various issues, and provides an opportunity for public review and comment.

Under California Environmental Quality Act (CEQA) Guidelines (Section 15163), the lead or responsible agency may choose to prepare a Supplement if minor additions or changes in the proposed action have occurred since circulation of a previous (Draft) EIR. The Supplement need only contain information necessary to make the previous (Draft) EIR adequate, therefore, this Supplement is considered to be part of the Draft EIR/EIS.

The areas for which this Supplement provides revised or clarified information for the proposed action include:

- Purpose and need for the proposed action.
- Changes to the description of the proposed action.
- Geology and soils.
- Surface hydrology and ground water.
- Mineral resources.
- Air quality.
- Noise.

Various technical reports have been prepared by Rail•Cycle which have been used in the preparation of the Draft EIR/EIS and this Supplement. These reports are available for review on request at the County and BLM offices listed above.

This Supplement is being distributed for a 60-day public review and comment period. This review and comment period begins on December 23, 1993, and ends on February 21, 1994. Written comments on the Supplement should be submitted to the County at the above address and should be received by February 21, 1994.

RAIL•CYCLE - BOLO STATION LANDFILL

SUPPLEMENT
TO
DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT

This document has been approved for public review.

Henri R. Bisson
District Manager
U.S. Bureau of Land Management

12/3/93
Date

Valery Pilmer
Planning Director
County of San Bernardino

12/2/93
Date

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CHAPTER 1.0
SUMMARY

1.0 SUMMARY

1 INTRODUCTION

In November 1992, the County of San Bernardino (County) and the U.S. Bureau of Land Management (BLM) completed the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to address the potential environmental consequences from construction and operation of the proposed Rail•Cycle-Bolo Station Landfill. The proposed action includes the rail transport of up to 21,000 tons per day of nonhazardous municipal solid waste from various cities and counties in southern California, and the construction and operation of a large capacity (2,100 acres), long-term (60 to 100 year), Class III landfill facility. The proposed landfill site is in a rural area of the Mojave Desert near the community of Amboy in San Bernardino County, California (see Figure 1.1).

The Draft EIR/EIS was distributed to agencies, organizations, and individuals for a 90-day review and comment period (December 4, 1992, to March 3, 1993). During the review and comment period, BLM held three public hearings to obtain verbal comments on the Draft EIR/EIS.

Since circulation of the Draft EIR/EIS, revised or clarified information was developed to respond to public comments on the Draft EIR/EIS regarding several environmental issues. To respond to various issues regarding potential environmental effects of the proposed action that were not fully addressed in the Draft EIR/EIS, the County and BLM decided that a Supplement to the Draft EIR/EIS would be prepared. The BLM issued a Notice of Intent to prepare a joint Supplemental Draft EIR/EIS for the proposed action on August 3, 1993. A copy of this Notice of Intent is included as Appendix A.

Under California Environmental Quality Act (CEQA) Guidelines (Section 15163), the lead or responsible agency may choose to prepare a Supplement if minor additions or changes in the proposed action have occurred since circulation of a previous (Draft) EIR. The Supplement need only contain information necessary to make the previous (Draft) EIR adequate, therefore, this Supplement is considered to be part of the Draft EIR/EIS.

The issue areas for which this Supplement provides revised or clarified information for the proposed action include:

- Purpose and need for the proposed action.
- Changes to the description of the proposed action - changes in the proposed action since distribution of the Draft EIR/EIS.
- Geology and soils.
- Surface hydrology and ground water.
- Mineral resources.
- Air quality.
- Noise.

For a complete understanding of the proposed action, the reader is referred to the Draft EIR/EIS. For the convenience of the reader, Table 1.1 Summary of Impacts, Mitigation Measures, and Unavoidable Adverse Impacts from the Draft EIR/EIS is included as Appendix B of this Supplement, for reference purposes.

6. Following distribution of the Draft EIR/EIS, two related regulatory requirements for the proposed action were met:

   - Under the National Historic Preservation Act (Section 106), a No Adverse Effect document was submitted to the State Historic Preservation Officer (SHPO). Projects on federal land are required to be reviewed for the potential to affect properties included in or eligible for inclusion in the National Register of Historic Places. The SHPO concurred with the findings of no adverse effect, therefore, the Section 106 process for the proposed Bolo Station Landfill is complete.
   - Under the requirements of Section 7 of the Endangered Species Act, a Biological Assessment for the proposed action was submitted to the U.S. Fish and Wildlife Service (USFWS). The USFWS issued its Biological Opinion for the proposed action and determined that the proposed action would not jeopardize the desert tortoise, a federal and state listed threatened species.

   Copies of the SHPO's concurrence on the no adverse effect and the USFWS's Biological Opinion are included as Appendices C and D, respectively.

7. The Supplement is being circulated for a 60-day public review and comment period. The distribution list for the Supplement is included in Chapter 10.0. Responses to comments submitted on the Draft EIR/EIS, and any additional comments submitted on the material contained in this Supplement, will be included in the Final EIR/EIS for the proposed action.

FIGURE 1.1

REGIONAL LOCATION MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC

SUMMARY OF PROPOSED ACTION

The proposed action is a private venture by Rail•Cycle: a limited partnership between the Atchison, Topeka, and Santa Fe Railway Company, Inc. (ATSF) and Waste Management of North America, Inc. (WMNA). To meet a portion of the solid waste disposal requirements for various southern California cities and counties, Rail•Cycle proposes to construct and operate a Class III nonhazardous solid waste landfill, as defined by California Code of Regulations (CCR) Title 23. Initial operation would begin with 3,000 tons of waste per day increasing to a maximum of 21,000 tons per day within five to seven years. Waste would be transported by rail from various areas of southern California in sealed 40- to 45-foot containers using existing rail lines to an onsite offloading facility. From the offloading facility, the containers would be transported a short distance to the landfill and emptied.

The proposed Bolo Station site consists of approximately seven and one-half sections of land near Bristol Dry Lake, south of the Bristol and Marble mountains. It is located midway between Cadiz and Amboy, along the ATSF rail line, as shown in Figures 1.2 and 1.3. Of the 4,870 acres included in the proposed site, 2,100 acres would be used for landfilling and 300 acres would be used for support facilities. The remaining 2,470 acres would be used as a buffer zone.

INTENDED USES OF EIR/EIS

The EIR/EIS is intended to provide the public and agencies with a comprehensive analysis of the proposed action with regard to: (1) environmental consequences; (2) mitigation measures to avoid or reduce impacts; and (3) identifying feasible alternatives. The level of technical detail, evaluation and analysis included in the EIR/EIS is consistent with CEQA and the National Environmental Policy Act (NEPA).

The EIR/EIS is the initial phase for the various permits or approvals processes conducted by agencies and governing boards with regulatory authority for the proposed action. These permits or approvals require submission of appropriate application packages, including technical reports, studies and engineering data, as necessary, and required by the permitting agencies.

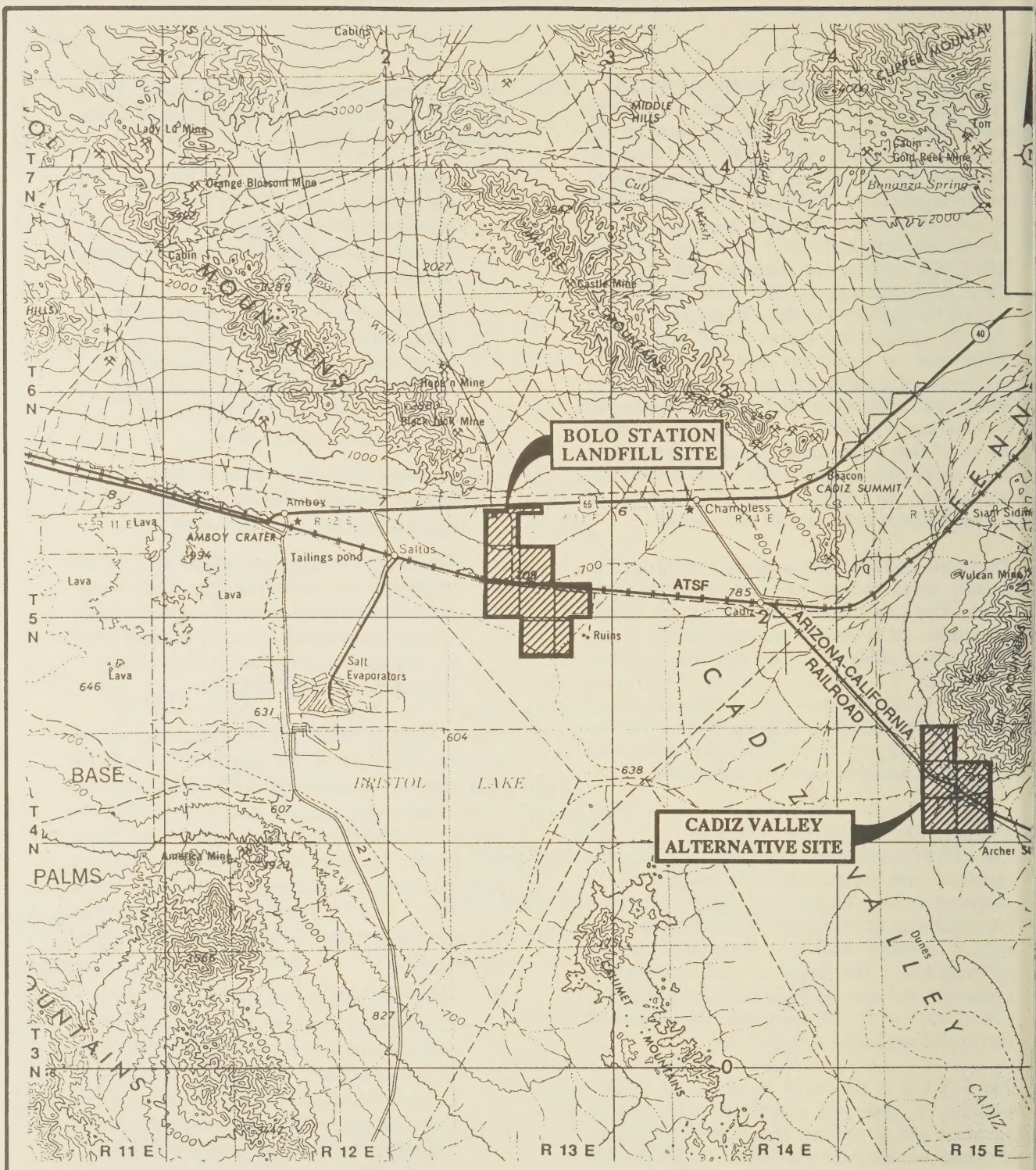
As the proposed landfill is in San Bernardino County, the proposed action would require an amendment of the County General Plan and issuance of a Conditional Use Permit (CUP). The proposed action would also require various other permits from local and state agencies.

4. As the proposed landfill includes public lands managed by the BLM, the proposed federal action includes the following:

   - Amendment of the California Desert Conservation Area (CDCA) Plan to redesignate the permitted land use of one and one-half sections of federal lands within the Bolo Station site.
   - Exchange in fee of surface and subsurface rights, including mineral rights, on two and one-half sections of federal land within the site for surface and subsurface rights on three sections of land owned by ATSF and/or Rail•Cycle.
   - Granting of an approximate 50- by 1,200-foot right-of-way across federal lands to provide a power line easement to the site.
   - Granting of an approximate 800- by 2,640 foot temporary (i.e., one to two year) right-of-way across federal property bordering Route 66 to provide construction access to the site. This is a change from a permanent right-of-way addressed in the Draft EIR/EIS.

5. The BLM has selected three noncontiguous sections of land owned by ATSF and/or Rail•Cycle for exchange: one located at the northeast corner of the Cadiz Dunes; one in Piute Valley; and one in the Fenner Valley/Providence Mountains (see Figure 1.4). The three proposed exchange sections were selected by BLM from a list of ATSF owned sections. BLM's preliminary evaluation of potential public value of the sections was based on the following:

   - Under the CDCA Plan (BLM, 1980), the Cadiz Dunes area is identified as a Planned Management Area for fish and wildlife. The proposed exchange section in the northern portion of the Cadiz Dunes provides a buffer and access to the Planned Management Area. The Cadiz Dunes are designated as a Special Area by BLM, due to the presence of a sparse but highly specialized plant community associated with the dune environment.
   - The proposed exchange section in Piute Valley is beneficial to BLM management goals, as it is composed of Category 1 desert tortoise (*Gopherus agassizii*) habitat.



0 4 8 MILES

SCALE

CONTOUR INTERVAL: 200 FEET

LEGEND

ATSF ATCHISON, TOPEKA, AND SANTA FE RAILROAD

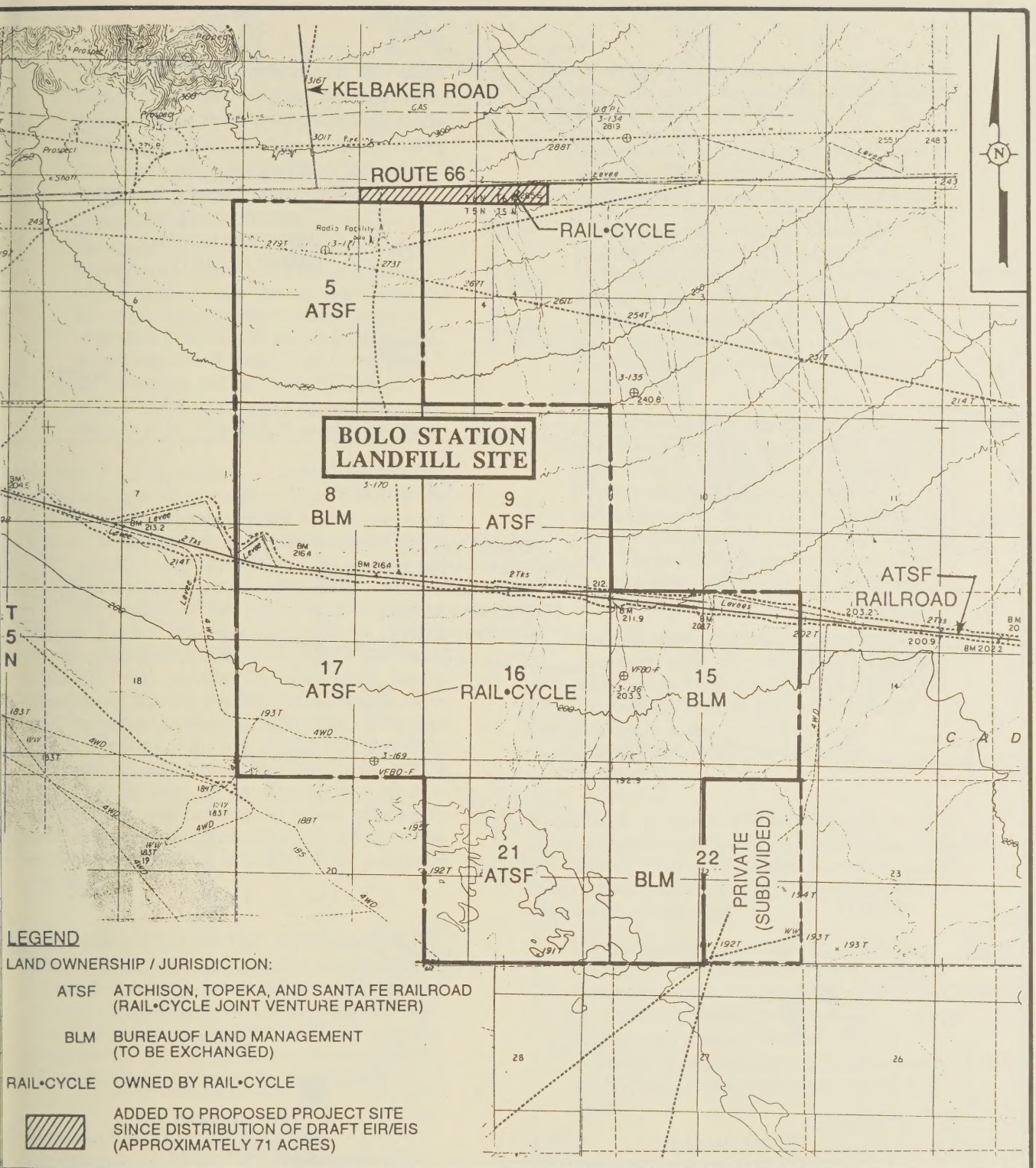
REFERENCE: U.S.G.S. 1 X 2 DEGREE TOPOGRAPHIC QUADRANGLE MAP OF NEEDLES, SAN BERNARDINO COUNTY, CALIFORNIA. DATED 1956 AND REVISED IN 1969.

FIGURE 1.2

SITE VICINITY MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC



LEGEND

LAND OWNERSHIP / JURISDICTION:

ATSF ATCHISON, TOPEKA, AND SANTA FE RAILROAD (RAIL•CYCLE JOINT VENTURE PARTNER)

BLM BUREAUOF LAND MANAGEMENT (TO BE EXCHANGED)

RAIL•CYCLE OWNED BY RAIL•CYCLE

ADDED TO PROPOSED PROJECT SITE SINCE DISTRIBUTION OF DRAFT EIR/EIS (APPROXIMATELY 71 ACRES)

0 4,000 8,000 FEET

SCALE

REFERENCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS OF AMBOY, BRISTOL LAKE NW, CADIZ, AND CALUMET MINE, SAN BERNARDINO COUNTY , CALIFORNIA. AMBOY, CADIZ, AND CALUMET MINE ARE PROVISIONAL EDITION MAPS AND ARE DATED 1985. BRISTOL LAKE NW IS DATED 1954 AND PHOTOREVISED IN 1984.

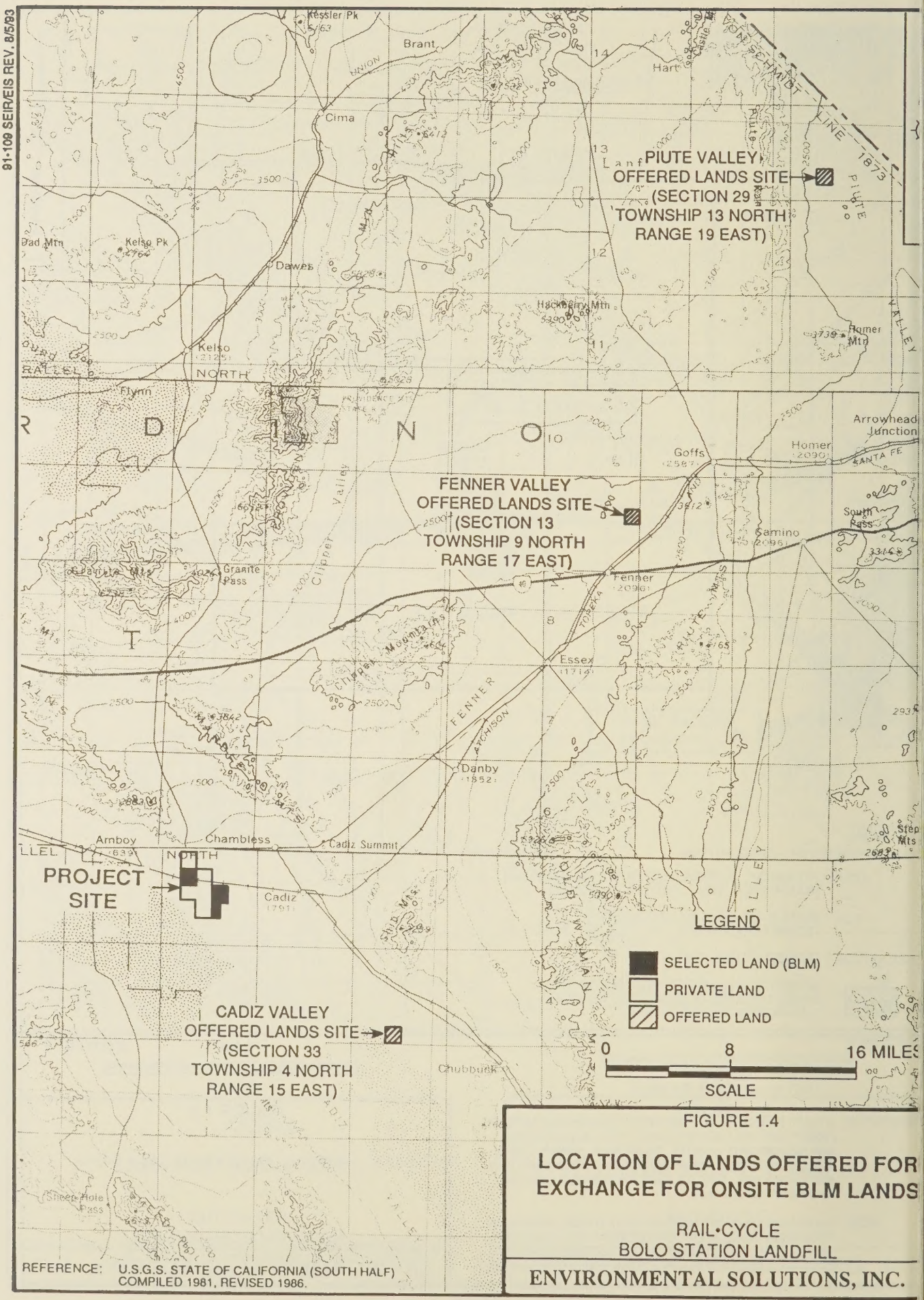
NOTE: PROVISIONAL EDITION MAPS SHOW CONTOUR INTERVALS, SPOT ELEVATIONS AND U.T.M. COORDINATES IN METERS. BRISTOL LAKE NW IS ON THE DATUM FOR 1927. CONTOUR INTERVALS AND SPOT ELEVATIONS ARE MEASURED IN FEET.

FIGURE 1.3

SITE LOCATION MAP

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



REFERENCE: U.S.G.S. STATE OF CALIFORNIA (SOUTH HALF) COMPILED 1981, REVISED 1986.

FIGURE 1.4

LOCATION OF LANDS OFFERED FOR EXCHANGE FOR ONSITE BLM LANDS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

- The proposed exchange section in the Fenner Valley/Providence Mountains area is located approximately 20 miles east/southeast of the Providence Mountains State Recreation Area. The area in which this section is located has been identified as a Category 1 habitat for desert tortoise.

  The exchange section in the Fenner Valley/ Providence Mountains is located in an area of the Mojave Desert that has been designated for surface use only due to the potential for subsurface hazard associated with unexploded World War II ordinance. This limitation is not considered critical by the BLM as the section would be managed for its biological resources (i.e., Category 1 tortoise habitat).

Section 2.4.3 of the Draft EIR/EIS listed other agencies that may utilize this EIR/EIS in considering approvals related to the proposed action. In addition to the agencies listed in the Draft EIR/EIS, this EIR/EIS will be used by the State Lands Commission in considering a modification or release of the State's right of surface entry to Section 16. Consistent with the phasing of the proposed action discussed in the Draft EIR/EIS, this action by the State Lands Commission may be required before Section 16 is used for construction of landfill cells. The State Lands Commission has indicated that this approval is necessary before soil, sand and/or gravel on the site can be displaced for landfill construction. Environmental issues relating to sand and gravel on the proposed site are discussed in Sections 4.3.3.1.3 and 5.3.1.2 of the Draft EIR/EIS.

.1 INTENDED USES OF THE SUPPLEMENT

This Supplement provides revised and/or clarified information for key issues that were the primary focus of comments received on the Draft EIR/EIS. The revised and/or clarified information in this Supplement is to be used in conjunction with the information included in the Draft EIR/EIS.

4 SUMMARY OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

Potential environmental effects of the proposed action and alternatives were evaluated according to criteria for significance established in the beginning of each section, based on Appendix G of the CEQA Guidelines and other appropriate criteria established as part of the Draft EIR/EIS. Mitigation measures to reduce or eliminate the impacts are also identified.

Based on the potential impacts identified and mitigation measures incorporated, the Draft EIR/EIS found that potential environmental effects of the proposed action could be reduced below a level of significance with the exception of:

- Ground water supply related to incremental increase in the amount of water for onsite use withdrawn from an aquifer in overdraft.
- Visual quality as a result of permanent alteration of the natural topography, and in the development of a long-term industrial activity in the project area, which changes the passive character of the site. Incompatibility with the Open Space Element (scenic resources) of the County General Plan.
- Modification of the rural "limited use" character of the land use of the area. The project site is within a County Resource Conservation District and requires reclassification to a land use designation which would allow more intense use of the site. The proposed action would also impact the open space value of the site associated with scenic resources.
- Socioeconomic character of the area in that increased employment opportunities would draw population to the region, and would establish or reinforce the concentration of population in the area and accelerate consumption of local land and water resources.

3. In addition to the above unavoidable adverse impacts identified in the Draft EIR/EIS, based on the revised analysis in this Supplement the following additional impacts have been found to be unavoidable and adverse:

- Air quality impacts related to continued exceedance of the states ambient air quality standard for particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and oxides of nitrogen (NO_X), and reactive organic gases (ROG) emissions in a federal and state nonattainment area for ozone.

1.5 EIR/EIS PROCESS

1. The following briefly summarizes the EIR/EIS process as it relates to the proposed action:

- **Notice of Preparation and Notice of Intent** - Public notification to prepare an EIR/EIS. The Notice of Preparation was distributed by the County to state agencies, local organizations, and individuals on August 16, 1991. The Notice of Intent prepared by BLM was published in the Federal Register on August 9, 1991.

- **Public Scoping Meetings** - Public scoping meetings were held by BLM in Twentynine Palms, and San Bernardino to solicit input of issues which should be addressed in the EIR/EIS from interested individuals, groups, agencies, and elected officials.
- **Notice of Completion and Federal Register Publication** - The availability of the completed Draft EIR/EIS was announced by the County with a Notice of Completion and by BLM through the U.S. Environmental Protection Agency (EPA) in the Federal Register.
- **Public Distribution of the Draft EIR/EIS for Review and Comment** - The Draft EIR/EIS was distributed for a 90-day review and comment period, to the public, including interested individuals, groups, government representatives, and agencies.
- **Public Hearings** - Three public hearings were held by the BLM during the 90-day Draft EIR/EIS review period, to provide the public with an opportunity to verbally comment on this document.
- **Notice of Intent to Prepare a Supplemental Draft EIR/EIS** - Public notification by the BLM that a Supplement to the Draft EIR/EIS for the proposed action will be prepared. This Notice of Intent was issued on August 3, 1993. A copy of the Notice of Intent is included as Appendix A of this Supplement.
- **Public Distribution of the Supplement** - The Supplement is being distributed for a 60-day review and comment period. During this time, interested individuals, groups, government representatives, and agencies will review the Supplement and submit comments.
- **Preparation of the Final EIR/EIS** - A Final EIR/EIS will be prepared to respond to comments by agencies and the public submitted as a result of review of both the Draft EIR/EIS and Supplement.
- **Filing and Availability of the Final EIR/EIS** - The Final EIR/EIS will be filed by the County with the California State Clearinghouse and by the BLM with the EPA. Copies of the Final EIR/EIS will be provided to the public and agencies. The County and BLM decision makers will consider the information included in the Draft EIR/EIS, Supplement, and Final EIR/EIS in their decision-making process.
- **Notice of Determination/Record of Decision** - After the Final EIR/EIS is file and made available to the public and agencies, the County Board of Supervisors will hold a public hearing regarding the adequacy of the EIR/EIS, make its decisior regarding the proposed action, and prepare and file a Notice of Determination. The BLM will make its decision regarding the proposed action, after a 60-day waiting period from the date the Final EIR/EIS is filed with the EPA, prepare a Record of Decision on its findings, and publish the decision in the Federal Register.

1.6 SUPPLEMENT FORMAT

1. The contents of the Supplement are arranged ir format similar to the Draft EIR/EIS to assist cross referencing between this Supplement and t Draft EIR/EIS. Only revised and/or clarifi information is addressed in this Supplemer Unless otherwise addressed in this Supplemer the information included in the Draft EIR/E remains unchanged.

2. The remainder of the Supplement is organized the following chapters:

   - **2.0 - Purpose and Need for the Proposed Action** - This chapter clarifie the objectives of the proposed action and the need for additional landfill capacity in southern California that could be provided by the proposed action.
   - **3.0 - Proposed Action and Alternatives** - Describes the changes to the proposed Bolo Station Landfill that have occurred since distribution of the Draft EIR/EIS or in response to mitigatio measures included in the Draft EIR/EIS.
   - **4.0 - Affected Environment** - This chapter provides a baseline description of tl environment for specific issues for which revised or clarified information is provided (i.e., geology and soils, surface hydrology and ground water, mineral resources, air quality, and noise).
   - **5.0 - Revised/Clarified Impacts an Mitigation Measures** - This chapter discusses revised and/or clarified potential impacts (for geology and soils, surface hydrology and ground water, mineral resources, air quality, and noise) resulting from implementation of the proposed actic and evaluates the significance of these impacts. Revised or additional mitigation measures that would reduce or avoid environmental effects are identified.

- **6.0 - Cumulative Impacts** - This chapter includes additional information on potential cumulative impacts from the proposed action and other projects in the region.
- **7.0 - Terms and Abbreviations** - Terms are described as they are used in this document, and a list of abbreviations is provided.
- **8.0 - List and Qualifications of Preparers** - This chapter identifies individuals who contributed to preparation of the Supplement.
- **9.0 - Organizations and Persons Consulted** - This chapter provides a list of individuals and organizations that have contributed data used in the Supplement.
- **10.0 - Distribution List For Supplement** - This chapter provides a list of those interested individuals, groups, government representatives, and agencies that have received a copy of the Supplement.
- **11.0 - References and Resources**
- **12.0 - Index**
- **Appendices:**
  - A - Supplement Notice of Intent
  - B - Draft EIR/EIS - Table 1.1 - Summary of Impacts, Mitigation Measures, and Unavoidable Adverse Impacts
  - C - California State Historic Preservation Office Letter
  - D - Section 7 Biological Opinion
  - E - Air emissions data
  - F - Traffic calculations
  - G - Noise calculations

CHAPTER 2.0
PURPOSE AND NEED FOR PROPOSED ACTION

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

Based on comments on the Draft EIR/EIS, this section clarifies and expands the discussion of the purpose and need for the proposed Rail•Cycle - Bolo Station Landfill. This clarified discussion focuses on the regulatory requirements for solid waste management and the regional need for additional landfill capacity.

This section presents an overview of the state's waste management strategy developed by the California Integrated Waste Management Board (CIWMB). The information included in this section demonstrates that even with meeting the source reduction and recycling goals of the California Integrated Waste Management Act of 1989 (AB 939), additional landfill capacity will be required in California to support the state's current and future waste disposal needs.

As discussed in the Draft EIR/EIS, the objectives of the proposed action are to:

- Develop a new privately owned and operated Class III solid waste disposal facility to provide a long-term option to various cities and counties in southern California to meet a portion of their projected demand for municipal solid waste landfill space.
- Develop long-term municipal solid waste landfill capacity in a remote desert setting so as to: (1) provide a state-of-the-art landfill to dispose of the residual waste following source reduction and recycling programs; (2) minimize land use compatibility conflicts often faced by landfills sited near residential or other urban areas; and (3) minimize potential environmental impacts, especially in the areas of air and water quality, as these effects would be reduced in an arid environment.

The proposed Bolo Station Landfill is designed to provide waste disposal services in the southern California region for 60 to 100 years. Rail•Cycle proposes to develop a waste-by-rail system at the Bolo Station Landfill, which would accept up to 21,000 tons per day of solid waste that has undergone recycling and reduction at materials recovery facilities (MRFs). The proposed landfill has the ability to:

- Serve a number of different municipalities and counties in southern California through a series of locally-sited and permitted MRFs, to assure that recyclable materials and unacceptable wastes (e.g., hazardous, medical) are removed from the waste stream prior to landfilling.
- Provide a long-term disposal option.

5. Many southern California communities are approaching a waste disposal shortfall as current landfills are reaching capacity and siting of new landfills in or near urban areas has become increasingly difficult due to land use compatibility and environmental issues. Of the southern California counties, Los Angeles County is expected to run out of landfill capacity first, perhaps as early as 1993 (CIWMB, 1992). For this reason, much of the following discussion focuses on Los Angeles County, which is expected to need landfill space such as that provided by the proposed Bolo Station Landfill, as soon as it becomes operational.

Now that we are in 1994, what happened? and/or others too? ± AB939?

6. Other southern California counties (e.g., San Bernardino, Riverside, San Diego, Orange, etc.) are projected to run out of landfill capacity in the next 6 to 18 years (CIWMB, 1992). These counties have a longer planning time frame, and the proposed Bolo Station Landfill may be considered as a long-term disposal option for a portion of the waste stream for these counties in the near future.

± AB939?

7. Regarding landfill capacity in San Bernardino County, the County has 17 active landfills that can meet the in-County requirements for solid waste disposal for approximately the next eight years. To meet the long-term disposal needs of the County, Rail•Cycle would, depending on reaching specific agreements with the County and the cities within the County, provide up to 6,000 tons a day of waste capacity at the Bolo Station Landfill for in-County waste. This capacity would be sufficient to dispose of the total volume of municipal solid waste currently requiring disposal in the County.

(± AB939?

how many tons go to 17 sites?

8. The following sections provide information on waste generation trends and existing disposal capacity for the metropolitan Los Angeles County area in particular and other southern California counties in general, as the framework for understanding the purpose and need for the proposed action. Further, the requirements of AB 939, and its effect on the quantity of waste requiring disposal and longevity of currently permitted landfills are reviewed to provide the

reader with an understanding of how communities that may dispose of waste at the proposed Bolo Station Landfill will meet the regulatory requirements of AB 939.

2.1 WASTE GENERATION TRENDS AND DISPOSAL CAPACITY

1. The need for substantial additional landfill capacity to serve southern California is demonstrated by various studies conducted by local, regional, and state agencies (Los Angeles County, 1988, 1993; SCAG, 1988; Riverside County, 1989; CIWMB, 1992). CIWMB's 1992 report entitled, *Reaching the Limit: An Interim Report on Landfill Capacity in California*, is the first step in an ongoing effort by CIWMB to examine the adequacy of remaining permitted landfill disposal capacity in California. The report also examines the issues associated with development of additional disposal capacity for waste that cannot be recycled or composted (CIWMB, 1992). The report provides a preliminary indication of the remaining permitted landfill disposal capacity in each county and for the state as a whole, based on assessments as of January 1990.

2. CIWMB found that the amount of solid waste disposed daily in California has been increasing annually. As of January 1990, approximately 42.5 million tons was disposed annually, an increase of approximately 5.5 million tons or 9.18 million cubic yards since January 1987. This is about 9 percent more than that projected in a previous CIWMB staff report, which was based on 1987 data (CIWMB, 1992). Per capita generation of solid waste in California was 7.9 pounds as of January 1990, up from 7.4 pounds in June 1985 (CIWMB, 1992).

3. While per capita solid waste generation has been increasing, population in the state has also been increasing. Recent California Department of Finance population projections predict that California's 1990 population will more than double by the year 2040 (increasing from 30 million to more than 63 million) (California Department of Finance, 1993). Given these trends, the need to develop effective solid waste management alternatives becomes ever more critical.

4. In January 1993, the CIWMB adopted a Strategic Plan to direct statewide management of solid waste (CIWMB, 1993). Impetus for the plan results are based on an estimate that approximately one-half of California counties, representing about two-thirds of the state's total population, ha landfill capacities of less than 15 years. Based this finding, CIWMB determined that addition disposal capacity will be necessary even if sol waste diversion goals mandated by legislati (i.e., AB 939) are met. These findings were bas on the fact that per capita waste generated California has increased at a faster rate than t state's population, as shown in Figure 2.1. T need for long-term landfill capacity remains even population declines or waste generation stabilize

5. The effect of population growth on solid was disposal capacity is particularly acute in southe California. Recent California Department Finance population figures show that the southe California counties of Los Angeles, Orang Riverside, and San Bernardino are among t fastest-growing counties in the state. In 19 alone, Los Angeles County population increas by 84,000 (California Department of Financ 1993).

6. The 1990 annual solid waste disposal rates a remaining permitted landfill capacity for southe California counties that may utilize the propos Bolo Station Landfill are provided in Table 2. As siting and permitting of new landfills can tal from five to seven years, and as several southe California counties are projected to run out landfill capacity within one to eight years fro 1993, the data in Table 2.1 underscore the pendi public need in several southern Californ counties, Los Angeles County in particular, f additional solid waste disposal capacity.

7. According to CIWMB data, Kern County wou follow Los Angeles County, reaching a was disposal shortfall in 1999. San Diego a San Bernardino counties would experienc shortfalls in 2000 and 2001, respectively, whi Orange and Riverside counties have sufficie landfill capacity until 2010 and 2011, respectivel

8. The Bolo Station Landfill, if approved, could b operational in 1994 and would continue operatio for 60 to 100 years depending on actual tonna landfilled daily. The waste disposal shortfal projected for the southern California countie therefore, could be met by the proposed Bo Station Landfill. The landfill could provide the counties with a realistic long-term waste dispos option for a portion of their waste strea Additionally, earlier use of the proposed Bo Station Landfill for a portion of the waste strea would result in increased longevity of in-coun landfills.

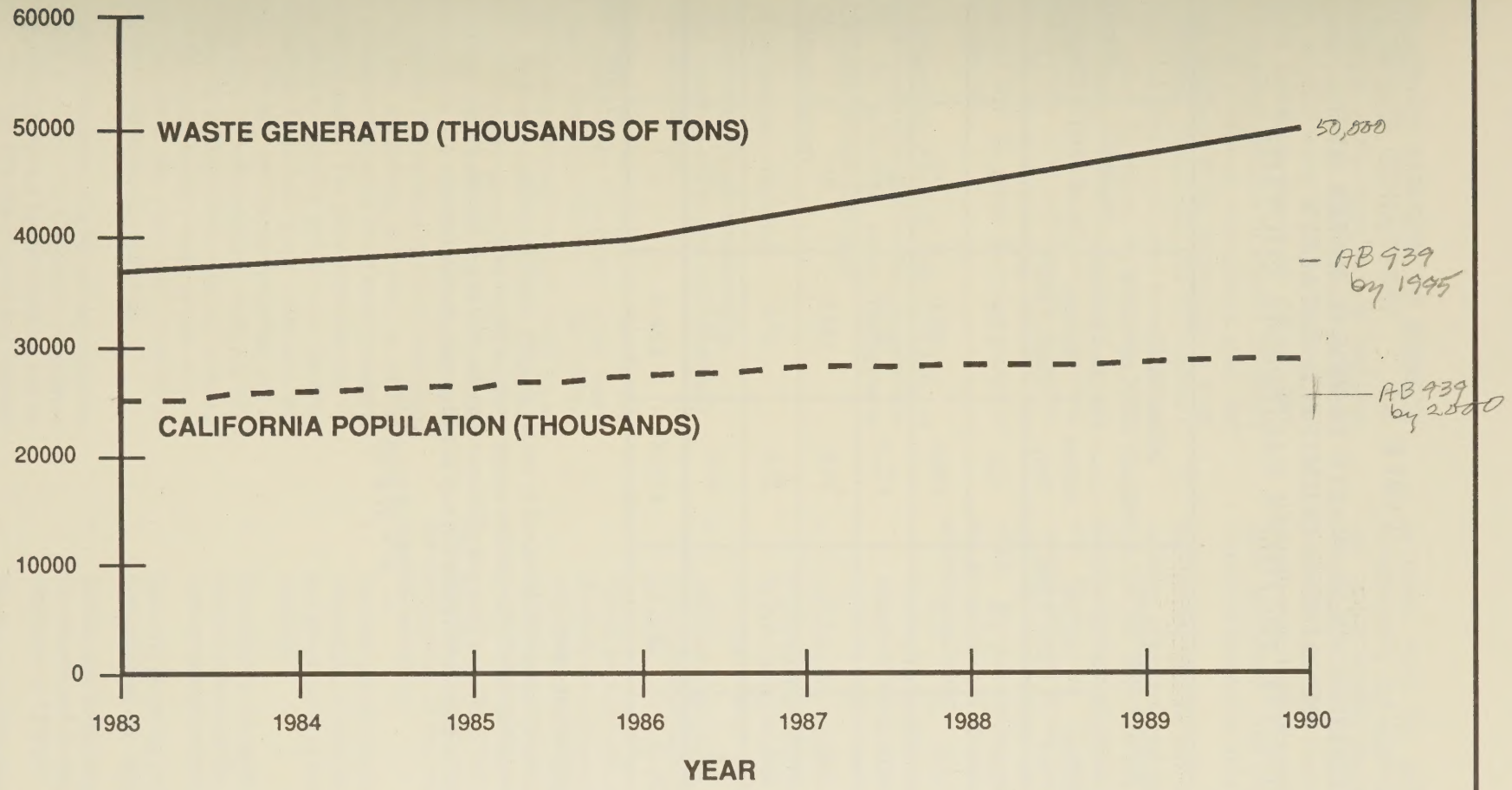


FIGURE 2.1

STATEWIDE WASTE GENERATION VERSUS POPULATION GROWTH

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

Sources: Population data from California Statistics; 1991.
Waste generation data from CIWMB Annual Report, 1986.

TABLE 2.1

EXISTING SOLID WASTE DISPOSAL RATES AND REMAINING PERMITTED CAPACITY SELECTED SOUTHERN CALIFORNIA COUNTIES[1]

COUNTY	ANNUAL DISPOSAL		REMAINING PERMITTED CAPACITY		YEARS[2] (as of 1990)	CURRENT PROJECTION (1993)[3]
	Million Tons	Million Cubic Yards	Million Tons	Million Cubic Yards		
Kern	0.9	1.5	8.2	13.8	9	6
Los Angeles	13.5	22.5	100.0	165.0	4	1
Orange	4.0	8.1	122.5	203.4	20	17
Riverside	1.9	3.5	74.8	136.0	21	18
San Bernardino	2.0	3.4	23.4	39.0	11	8
San Diego	4.0	6.7	43.6	72.7	10	7
TOTAL	**26.3**	**45.7**	**372.5**	**629.9**	–	–

91-109 (8/3/93/jtw

(1) As of January 1990 (CIWMB, 1992).
(2) Years remaining by county cannot be determined by simply dividing remaining cubic yards or tons by annual disposal due to variation among county methodologies.
(3) Current projection (1993) reflects a three year difference from the 1990 data (CIWMB, 1992), and does not incorporate subsequent factors that may affect in-county landfill capacity.

2 like AB939?

REGULATORY EFFORTS TO REDUCE SOLID WASTE GENERATION

In recognition of the importance of long-term management of landfill capacity and to reduce the volume of solid waste requiring disposal, the California legislature passed AB 939 in 1989. AB 939 requires counties to prepare integrated county-wide solid waste management plans and mandates reductions in the volume of solid waste being landfilled. Specifically, AB 939 requires a 25 percent reduction in solid waste being landfilled by 1995 and a 50 percent reduction by 2000. These reductions are to be accomplished through source reduction, recycling, and composting. AB 939 requires cities and counties to prepare source reduction and recycling elements that demonstrate how the waste diversion mandates will be achieved.

In implementing AB 939, the CIWMB, in cooperation with cities and counties, is required to promote the following waste management practices, listed in order of priority:

- Source reduction.
- Recycling and composting.
- Environmentally safe transformation (e.g., waste-to-energy) and environmentally safe land disposal.

Cities and counties are required to develop and submit county-wide integrated solid waste management plans (CoIWMPs) to the CIWMB that indicate how they will meet the waste stream reduction goals mandated by AB 939. Cities and counties are required annually to report ongoing waste management activities and to demonstrate compliance with AB 939. The CoIWMPs must contain specific descriptions of source reduction, recycling, and composting activities, as well as efforts to educate the public about source reduction and recycling goals. The plans must also specify funding and provisions for special waste handling and household hazardous waste collection and disposal. CIWMB can impose penalties (up to $10,000 a day) for noncompliance with AB 939. Local efforts to manage solid waste are overseen by CIWMB, which actively seeks to find ways to support and assist the cities and counties in meeting their solid waste disposal needs.

Even with achievement of a 50 percent reduction in landfilled waste, the California legislature recognized that additional landfill capacity will be required. Thus AB 939 also requires that counties secure long-term (15 years) disposal capacity for waste that is not diverted. Jurisdictions are required to develop county-wide siting elements and solid waste facility components to assure that locations exist for environmentally safe transformation and disposal facilities of wastes that cannot feasibly be reduced, recycled, or composted. This long-term capacity can be provided at facilities located within the city or county or at facilities within other jurisdictions, upon agreement. The proposed Bolo Station Landfill is designed to serve this function.

5. Recognizing that the state must take the lead in assisting cities and counties in complying with AB 939, the 1993 CIWMB Strategic Plan states that developing markets for recyclable materials is the most cost effective, efficient, and environmentally sound way to meet mandated goals for maximizing waste diversion (CIWMB, 1993). The plan outlines strategies for expanding the acceptability of products made from recycled materials, including:

   - Developing baseline data regarding current usage rate of products made from recyclable materials for comparative purposes.
   - Initiating legislation or administrative action encouraging governments to lead by example by purchasing products made from recyclable materials, when available.
   - Implementing a public education campaign to buy products made from recyclable materials.
   - Taking an active role in promoting the development and use of products made from recyclable materials through such actions as minimum content laws, labeling, advanced research and development, and others.

6. The plan also includes strategies for facilitating the development of new markets for recyclable materials including:

   - Increasing public investment and encouraging private investment in research and development of markets for recyclable materials.
   - Encouraging increased investments in start-up companies that manufacture products from recyclable materials.
   - Focusing efforts on recyclable materials with high potential use value.
   - Seeking and committing additional funding for research and development activities conducted by CIWMB.
   - Serving as a clearinghouse for ideas and investors in market development.
   - Using market development to create revenue for local governments to offset collection and processing costs.

7. Waste prevention through source reduction is one of the top waste management priorities of CIWMB. To help local governments, private industry, and citizens reduce the amount of waste they produce, CIWMB, through its Strategic Plan, proposes to:

   - Improve methodologies for waste prevention.
   - Implement a public education program about effective waste prevention behaviors.
   - Assess the viability of an advanced disposal fee.
   - Provide technical assistance, and research and development for products and packaging that create less waste.
   - Improve and implement the voluntary use of waste audits by governments, businesses, and households.

2.3 SOLID WASTE DISPOSAL ISSUES IN LOS ANGELES COUNTY

2.3.1 ANTICIPATED SHORTFALL IN DISPOSAL CAPACITY

1. Initially, the majority of solid waste entering the proposed Bolo Station Landfill is anticipated to be from Los Angeles County. This projection is based on studies conducted by Los Angeles County and CIWMB which show a pending solid waste disposal capacity shortfall in Los Angeles County due to lack of mid- and long-term landfill capacity (Los Angeles County, 1993; CIWMB, 1992, 1993). The most recent data regarding current Los Angeles County waste disposal capacity projections were compiled in February 1993 as part of the consideration of the proposed Puente Hills Landfill Expansion (Los Angeles County, 1993).

2. This study found that over the past ten years, there has been a general growth in per capita waste disposal of 2.5 percent per year in metropolitan Los Angeles County. The rate of per capita waste generation varies depending on a number of factors, including population growth and regional economy. The recession of the last few years has been attributed as one of the primary reasons that waste disposed has decreased from about 46,000 tons per day in 1989 to about 40,000 tons per day in 1992 (Los Angeles County, 1993).

3. The 1993 Los Angeles County solid waste disposal projections assume continuation of the 2.5 percent growth trend in waste generation until the year 2000, at which point it is assumed that waste generation will decrease to 1 percent per year, reflecting increases in population c (Los Angeles County, 1993). The projecti also assume that there would be no increase in capita generation rate after 2000, due to the eff of AB 939 mandates.

4. After source reduction and diversion (a cur average of approximately 18 percent county-wi the average daily disposal rate in metropoli Los Angeles County was 39,800 tons per da 1992. An additional 1,700 tons per day w consumed at the county's two waste-to-ene facilities. This amount (1,700 tons per day expected to remain constant, limited by wa stream contracts for the waste-to-energy facilit Table 2.2 lists the average daily tonnage and portion remaining after waste reduction diversion percentages have been appli Table 2.2 also provides information on permitted daily tonnage capacity for metropoli Los Angeles County landfills for the years 1 through 2014.

5. As Table 2.2 shows, at the end of 1993 wa generation in metropolitan Los Angeles Count expected to be approximately 51,509 tons per c up 2.5 percent from 1992 (Los Angeles Cou 1993). With a projected diversion rate 22.2 percent, the required disposal capacity wo be approximately 40,074 tons per day. existing eight landfills in Los Angeles County currently permitted to accept 43,224 tons per c resulting in a remaining disposal capacity 3,150 tons per day in 1993. If the BKK Lanc closes in 1995, as expected, the daily capac shortfall would be approximately 21,764 tons day beginning in 1995. By the year 2000, e with the 50 percent reduction mandated AB 939, Los Angeles County projects a lanc capacity shortfall of approximately 26,608 t per day (Los Angeles County, 1993).

6. Several proposals are currently under considerat to provide additional solid waste disposal capac within Los Angeles County to help alleviate projected shortfall. Applications to extend permit life of the Puente Hills Landfill for additional 20 years at a capacity of 12,000 t per day, as well as to extend the life of Sunshine Canyon Landfill (its permit expirec 1991) for an additional nine years at an aver daily disposal rate of 6,000 tons per day are process. In addition, an EIR has been comple for a proposal to increase the daily capacity at BKK Landfill by 1,100 tons per day, but proposal does not include extension of its perm and BKK would still close in 1995. For location of these and other landfills Los Angeles County, see Figure 2.2.

SOLID WASTE DISPOSAL PROJECTIONS
EXISTING LANDFILL PERMIT CAPACITY
METROPOLITAN LOS ANGELES COUNTY[1]

YEAR	WASTE GENERATION RATE[2]	PERCENT DIVERSION	DISPOSAL NEED[3]	SPADRA	BKK (proposed)	SCHOLL CANYON	BRADLEY WEST	LOPEZ CANYON	CHIQUITA CANYON	CALABASAS	PUENTE HILLS	TOTAL DISPOSAL CAPACITY	EXCESS CAPACITY/ (SHORTFALL)
1993	51,509	22.20	40,074	3,000	12,000	2,022	7,000	3,333	1,443	2,426	12,000[4]	43,224	3,150
1994	52,797	23.60	40,337	3,000	12,000	2,044	7,000	3,333	1,443	2,453		31,273	(9,064)
1995	54,116	25.00	40,587	2,500	P	2,067	7,000	3,333	1,443	2,480		18,823	(21,764)
1996	55,469	30.00	38,829	2,500		2,015	7,000	P	1,443	2,418		15,376	(23,453)
1997	56,856	35.00	36,956	2,500		1,965	C		P	2,358		6,823	(30,133)
1998	58,278	40.00	34,967	2,500		1,916				2,299		6,715	(28,252)
1999	59,734	45.00	32,854	C		1,868				2,241		4,109	(28,745)
2000	61,228	50.00	30,614			1,821				2,185		4,006	(26,608)
2001	61,840	50.00	30,920			1,839				2,207		4,046	(26,874)
2002	62,459	50.00	31,229			1,858				2,229		4,087	(27,142)
2003	63,083	50.00	31,542			1,876				2,251		4,127	(27,415)
2004	63,714	50.00	31,857			1,895				2,274		4,169	(27,688)
2005	64,351	50.00	32,176			1,914				2,297		4,211	(27,965)
2006	64,995	50.00	32,497			1,933				2,320		4,253	(28,244)
2007	65,645	50.00	32,822			1,952				2,343		4,295	(28,527)
2008	66,301	50.00	33,150			1,972				2,366		4,338	(28,812)
2009	66,964	50.00	33,482			1,992				2,390		4,382	(29,100)
2010	67,634	50.00	33,817			2,012				2,414		4,426	(29,391)
2011	68,310	50.00	34,155			2,032				2,438		4,470	(29,685)
2012	68,993	50.00	34,497			2,052				C		2,052	(32,445)
2013	69,683	50.00	34,841			C						0	(34,841)
2014	70,380	50.00	35,190									0	(35,190)

91-109 (12/2/93/mg)

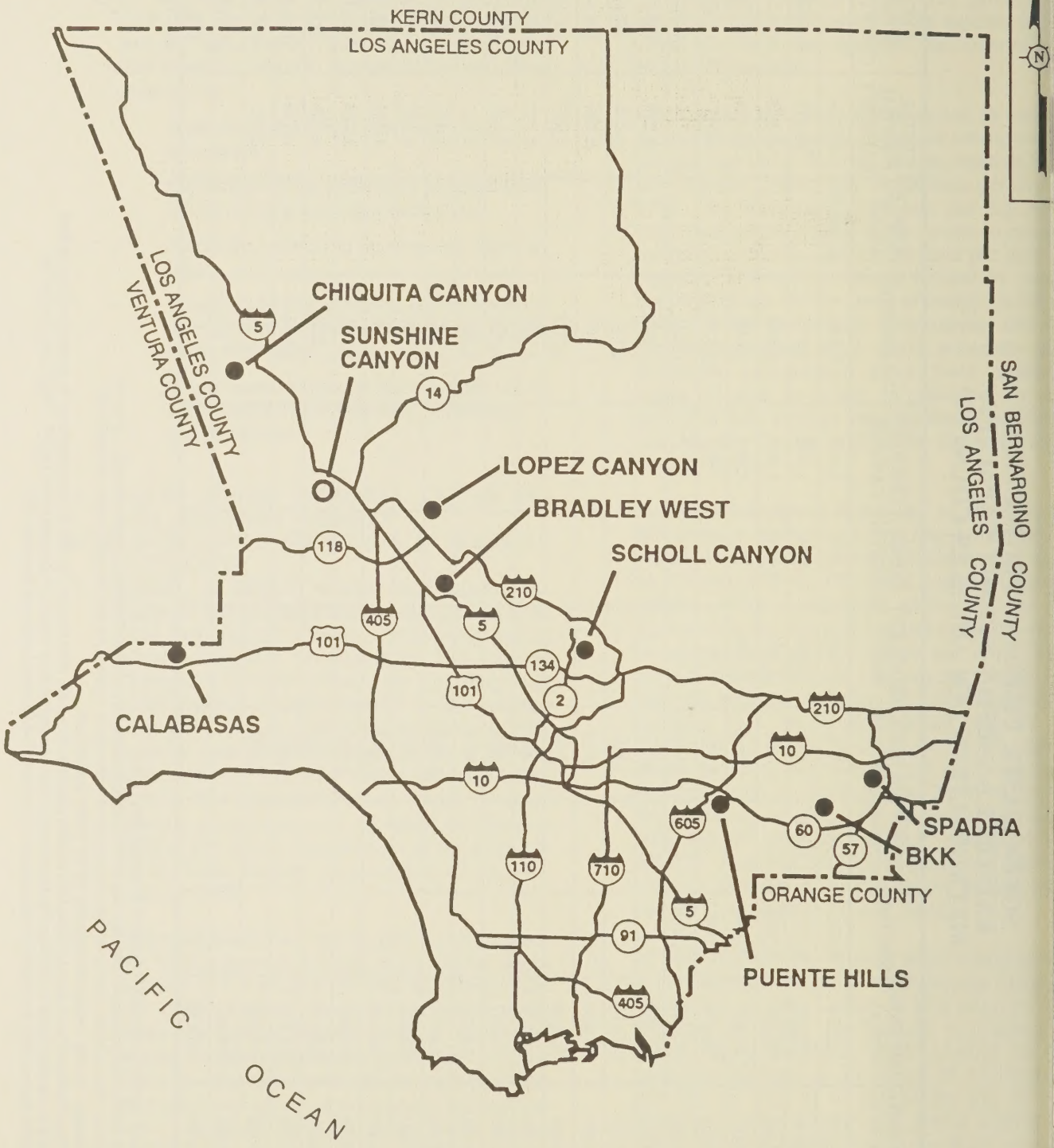
(1) Los Angeles County, 1993. Disposal capacity or shortfall is expressed in tons per day.

(2) Waste generation rate increases by a total of 2.5 percent per year beginning in 1990, which accounts for a 1 percent increase in population and a 1.5 percent increase in per capita waste generation. After 2000 the waste generation rate is assumed to increase at 1 percent per year due to population increases only.

(3) Figures represent expected daily tonnage: Six-day average and assuming AB 939 is fully implemented.

(4) The Land Use Permit and Solid Waste Facilities Permit for the Putente Hills Landfill expires in November 1993; however, an EIR for the extension of its permits has been certified and a Land Use Permit issued, and it is expected that its Solid Waste Facilities Permit will be extended to allow continued operation of this landfill. While it appears that the Puente Hills Landfill will be extended beyond 1993, for purposes of this analysis it is assumed that its permits expire in November 1993.

P = Closed Due to Permit Expiration.
C = Closed Due to Exhausted Capacity.



NOT TO SCALE

LEGEND

- ● EXISTING MAJOR LANDFILL
- ○ CURRENTLY CLOSED; COULD REOPEN PENDING OUTCOME OF LITIGATION

SOURCE: SANITATION DISTRICTS OF LOS ANGELES COUNTY, 1992.

FIGURE 2.2

EXISTING LANDFILLS LOS ANGELES COUNTY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

The Puente Hills Landfill expansion was recently approved for an average of 12,000 tons per day (not to exceed 13,200 tons per any single day) for ten years. There is a higher degree of uncertainty about approvals for the extension of the Sunshine Canyon and BKK landfills.

Although the above three proposals are controversial, for the purpose of this analysis, it is assumed that the three projects will proceed although probably not until at least 1994. Table 2.3 incorporates the same waste generation and diversion information contained in Table 2.2, but compares disposal requirements against total disposal capacity available if the Puente Hills, Sunshine Canyon, and BKK proposals are permitted. As shown in Table 2.3, under this scenario, there would be a solid waste disposal capacity shortfall beginning in 1995 and continuing through subsequent years.

Even with approval of Puente Hills, Sunshine Canyon, and BKK, by the year 2008 (which is the 15-year planning time frame specified by AB 939), Los Angeles County is projected to experience a shortfall of over 16,800 tons per day in landfill disposal capacity (see Figure 2.3). While Table 2.3 assumes approval for extension of services at these three in-county landfills, a range of scenarios could actually occur. These varying scenarios could result in an increased disposal capacity shortfall for metropolitan Los Angeles County.

2 LOS ANGELES COUNTY WASTE MANAGEMENT PRACTICES

2.1 Disposal Methods

In response to its solid waste disposal needs and prior to the passage of AB 939, Los Angeles County has been working for a number of years to develop additional methods for solid waste management, including additional in-county landfill capacity, waste-to-energy facilities and recycling programs. In the early 1980s, the Sanitation Districts of Los Angeles County, in concert with the County of Los Angeles, established solid waste management goals that included the objective that almost one-half of the waste produced be managed as waste-to-energy facilities. However, by 1987, as a result of substantial public opposition, the waste-to-energy facilities being proposed at the time throughout the county were not implemented (Los Angeles County, 1992).

In response to public opposition to waste-to-energy facilities, the Sanitation Districts, County of Los Angeles Department of Public Works, and City of Los Angeles Bureau of Sanitation collaborated in preparing a report entitled *Solid Waste Management Status and Disposal Options in Los Angeles County*. The report described the potential future disposal shortfall facing the county and outlined feasible management strategies for handling estimated future quantities of waste. As a follow up of this study, in late 1987 the Sanitation Districts and Los Angeles County Department of Public Works jointly prepared a report, *Preliminary Alternate Site Study*, in response to a request from the Los Angeles County Board of Supervisors to identify the "five best landfill sites currently not being used in the County."

3. This preliminary siting study ranked a total of 101 sites throughout the county according to various solid waste, technical and environmental criteria, and ranked six sites significantly higher than the remaining 95. Two sites, Toyon Canyon and Brown's Canyon, were eliminated from further study due to geology issues. One of the four remaining sites, Elsmere Canyon, has been proposed for landfill development by a private proponent, and an EIS/EIR is currently being prepared by the U.S. Forest Service and Los Angeles County. The remaining three sites, Blind Canyon, Towsley Canyon and Mission-Rustic-Sullivan Canyons, were evaluated as potential landfill sites in the August 1990 Draft Program EIR for the Integrated Solid Waste Management System for Los Angeles County. The locations of the four potential sites are shown in Figure 2.4.

4. Development of Towsley and Blind canyons into landfills has been impeded by property purchases by the Santa Monica Mountains Conservancy for state park development. In addition, the May 1990 Joint Powers Agreement between the City of Los Angeles and County of Los Angeles would eliminate the potential for development of Mission-Rustic-Sullivan Canyons for landfill purposes if Elsmere Canyon is sited.

5. In the 1992 Puente Hills Landfill Expansion EIR, Los Angeles County notes that, due to the time required to prepare a new site for landfilling, in addition to the lengthy permitting process, a new landfill could not be available for approximately five to seven years (Los Angeles County, 1992). The county also concluded that, in the context of its efforts to identify additional landfill capacity, both in-county and out-of-county disposal capacity are important to a viable long-term solution to disposal needs. In the meantime, the Sanitation Districts continue to monitor the availability of property for new landfill sites within Los Angeles County.

TABLE 2.3

SOLID WASTE DISPOSAL PROJECTIONS
PROPOSED EXPANSION LANDFILLS
METROPOLITAN LOS ANGELES COUNTY[1]

YEAR	WASTE GENERATION RATE[2]	PERCENT DIVERSION	DISPOSAL NEED[3]	SPADRA	BKK (proposed)	SCHOLL CANYON	BRADLEY WEST	LOPEZ CANYON	CHIQUITA CANYON	CALABASAS	PUENTE HILLS	SUNSHINE CANYON (proposed)	TOTAL DISPOSAL CAPACITY	EXCESS CAPACITY/ (SHORTFALL)
1993	51,509	22.20	40,074	3,000	12,000	2,022	7,000	3,333	1,443	2,426	13,000	--	43,224	3,150
1994	52,797	23.60	40,337	3,000	12,000	2,044	7,000	3,333	1,443	2,453	12,000	6,000	49,273	8,936
1995	54,116	25.00	40,587	2,500	P	2,067	7,000	3,333	1,443	2,480	12,000	6,000	36,823	(3,764)
1996	55,469	30.00	38,829	2,500		2,015	7,000	P	1,443	2,418	12,000	6,000	33,376	(5,453)
1997	56,856	35.00	36,956	2,500		1,965	C		P	2,358	12,000	6,000	24,823	(12,133)
1998	58,278	40.00	34,967	2,500		1,916				2,299	12,000	6,000	24,715	(10,252)
1999	59,734	45.00	32,854	C		1,868				2,241	12,000	6,000	22,109	(10,745)
2000	61,228	50.00	30,614			1,821				2,185	12,000	6,000	22,000	(8,608)
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2002	62,459	50.00	31,229			1,858				2,229	12,000	6,000	22,087	(9,142)
2003	63,083	50.00	31,542			1,876				2,251	12,000	6,000	22,127	(9,415)
2004	63,714	50.00	31,857			1,895				2,274	12,000	C	16,169	(15,688)
2005	64,351	50.00	32,176			1,914				2,297	12,000		16,211	(15,965)
2006	64,995	50.00	32,497			1,933				2,320	12,000		16,253	(16,244)
2007	65,645	50.00	32,822			1,952				2,343	12,000		16,295	(16,527)
2008	66,301	50.00	33,150			1,972				2,366	12,000		16,338	(16,812)
2009	66,964	50.00	33,482			1,992				2,390	12,000		16,382	(17,100)
2010	67,634	50.00	33,817			2,012				2,414	12,000		16,426	(17,391)
2011	68,310	50.00	34,155			2,032				2,438	12,000		16,470	(17,685)
2012	68,993	50.00	34,497			2,052				C	12,000		14,052	(20,445)
2013	69,683	50.00	34,841			C					12,000		12,000	(22,841)
2014	70,380	50.00	35,190								C		0	(35,190)

91-109 (12/2/93/mg)

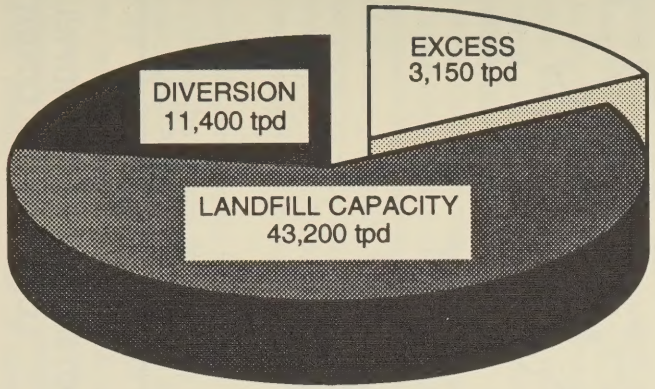
(1) Los Angeles County, 1993. Disposal capacity or shortfall is expressed in tons per day.

(2) Waste generation rate increases by a total of 2.5 percent per year beginning in 1990, which accounts for a 1 percent increase in population and a 1.5 percent increase in per capita waste generation. After 2000 the waste generation rate is assumed to increase at 1 percent per year due to population increases only.

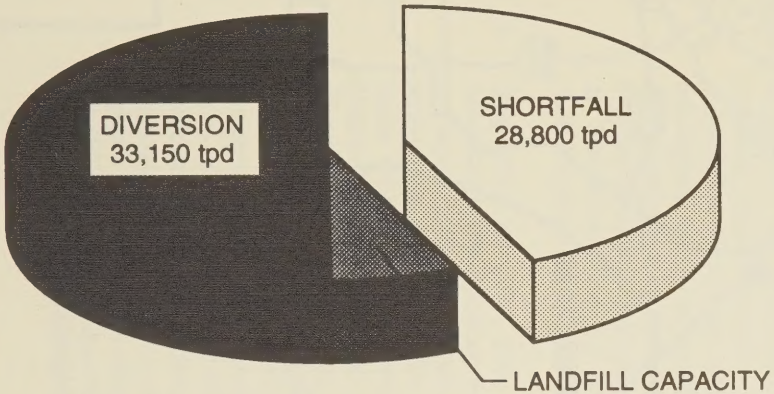
(3) Figures represent expected daily tonnage: 6-day average and assuming AB 939 is fully implemented.

P = Closed Due to Permit Expiration.

EXISTING PERMIT CONDITIONS (1)

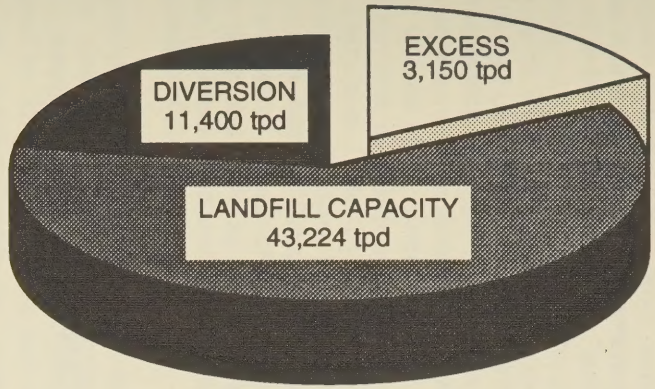


1993 TOTAL = 51,500 tpd

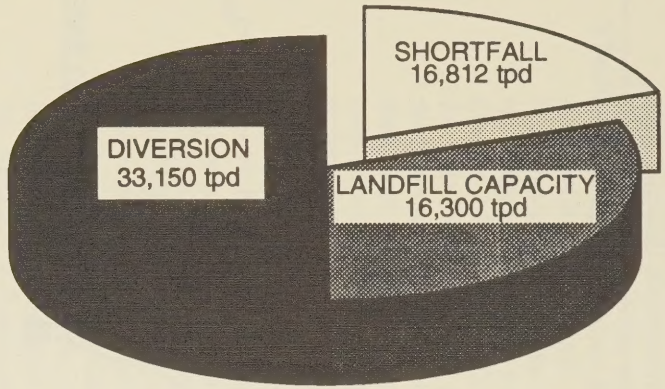


2008 TOTAL = 66,300 tpd

PROPOSED PUENTE HILLS, BKK, AND SUNSHINE CANYON EXPANSIONS PERMITTED (2)



1993 TOTAL = 51,500 tpd



2008 TOTAL = 66,300 tpd

LEGEND

tpd TONS PER DAY; 6 DAY AVERAGE

EXCESS/SHORTFALL

LANDFILL CAPACITY

DIVERSION

(1) SEE TABLE 2.2

(2) SEE TABLE 2.3

SOURCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS,1993.

FIGURE 2.3

SOLID WASTE DISPOSAL CAPACITY/ SHORTFALL METROPOLITAN LOS ANGELES COUNTY

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

NOT TO SCALE

LEGEND

● POTENTIAL NEW LANDFILL SITE

FIGURE 2.4

POTENTIAL NEW LANDFILL SITES
LOS ANGELES COUNTY

RAIL•CYCLE
BOLO STATION LANDFILL

SOURCE: SANITATION DISTRICTS OF LOS ANGELES COUNTY, 1992.

ENVIRONMENTAL SOLUTIONS, INC

.2 Source Reduction and Recycling

In addition to seeking additional landfill capacity, Los Angeles County (and other southern California counties) is working to reduce the quantity of waste to be disposed at landfills. As required by AB 939, most cities in the county have submitted source reduction and recycling elements to the Los Angeles County Solid Waste Task Force, which provides local review and comment on plans prior to submittal to CIWMB. According to these plans, current diversion rates estimated by most jurisdictions in Los Angeles County range from 10 to 25 percent, with a county-wide average diversion of approximately 18 percent (Los Angeles County, 1992). This diversion is achieved through programs of source reduction, reuse, and recycling that divert waste generated by residential, commercial/industrial, and construction/demolition sources.

To help achieve source reduction and reuse through community awareness and education programs, each city is pursuing a public awareness program, as mandated by AB 939. Over one-half of the cities in Los Angeles County are proposing backyard composting of yard and garden wastes as a source reduction technique. In addition, other source reduction techniques such as the use of a per container or per pound waste collection fees, have been proposed by approximately one-fourth of the cities.

The types of recycling programs being used vary, depending on the source and characteristics of the waste (i.e., residential, commercial, industrial, or construction/demolition). Nearly two-thirds of the cities in Los Angeles County either have, or are planning to have, residential curbside separation and collection programs to recover recyclables from the single-family residential waste stream. Approximately one-half of the cities have proposed multi-family dwelling programs. In addition, some cities plan to require office recycling programs for white paper and computer paper as a condition for issuing business licenses, or establish recycling program requirements in building codes in an effort to recover recyclables from the commercial waste stream.

The operation of conveniently located buy-back recycling centers throughout the state has been facilitated through AB 2020 (known as the Bottle Bill) and AB 939. The continued use of such facilities has been proposed by one-fourth of the cities in Los Angeles County. As formal recycling programs, such as curbside programs, become more prevalent, the use of drop-off locations will likely decline.

5. A review of the cities' source reduction and recycling elements conducted for the 1992 Puente Hills Landfill Expansion EIR indicate that the emphasis for achieving year 1995 diversion goals in Los Angeles County has been placed on the residential waste stream, a fairly well-defined homogenous source with established methods for recovering recyclable materials (Los Angeles County, 1992). The 1992 EIR acknowledges that for Los Angeles County to meet the 50 percent diversion requirement by the year 2000, it is most likely that extensive recovery efforts aimed at the commercial waste stream will have to be implemented.

6. Regional facilities such as MRFs and landfills provide further opportunities for recycling selected materials from the commercial and industrial waste stream. At MRFs, recyclables are recovered from either a mixed-waste stream or a waste stream of source-separated mixed recyclables through mechanical and/or manual separation. Residual wastes from MRFs (i.e., material that cannot be feasibly recycled) are then transported to a landfill for disposal. Based on currently available information, approximately one-third of the cities in Los Angeles County have proposed diversion of waste to MRFs to meet a portion of the AB 939 diversion mandates.

7. In addition to the proposed diversion of recyclables at MRFs, the Sanitation Districts' landfills currently recover materials from commercial and construction demolition waste, such as clean dirt and asphalt, which are reused onsite for daily cover and winter operating deck construction. More than 8 million tons of asphalt and dirt have been reused at Sanitation District landfills since 1983 (Los Angeles County, 1992).

8. Beginning in 1987, the Sanitation Districts conducted a demonstration wood recovery program at Puente Hills Landfill after efforts to contract with private companies were not effective. Waste loads with a high percentage of wood were diverted, loaded onto trucks and transported to the Commerce waste-to-energy facility. During this time, the Sanitation Districts published a brochure, *Why Waste Woods?*, identifying local companies that would accept and recycle clean loads of wood. This publication proved to be successful in diverting clean wood from landfill disposal. A recent survey has indicated that the number of wood loads received at Puente Hills Landfill has decreased over 90 percent compared to 1985 (Los Angeles County, 1992).

9. In 1985, the Sanitation Districts had discussions with proponents of a facility to be located in the Riverside area that would use tires as a fuel source. The facility was never developed and the Sanitation Districts proceeded to pursue alternative methods of diverting tires from landfill disposal. The Sanitation Districts began tire recovery and shredding operations at several sites in 1988 and continue to process tires by recycling retreadable tires and shredding tires for recycle markets or disposal. Over 75,500 tons of tires have been shredded, with almost 1,800 tons recycled. Use of rubberized asphalt for road paving is currently ongoing. Although feasible alternative uses for most of the shredded tires have not been found, the Sanitation Districts continue to look for diversion opportunities.

10. Recognizing that green waste (yard and garden waste) accounts for a significant portion of the residential waste stream, the Sanitation Districts conducted a demonstration green waste composting program in July 1988. The Sanitation Districts worked with CIWMB to establish the use of green waste for alternative daily cover. This demonstrated use of green waste will provide a guaranteed market for green waste so that cities can more conveniently pursue green waste source separation and collection programs. Green waste can also be used for erosion control and be composted for use as a soil amendment. Since green waste makes up approximately 12 percent of the total waste stream and one-third of the residential waste stream, most cities in Los Angeles County are proposing a green waste recovery program consisting of local composting facilities or use of the Sanitation Districts' onsite recovery program.

11. In 1992, the Sanitation Districts began recovering refrigerators and air conditioners from county landfills. Chlorofluorohydrocarbons are recovered at the landfill and recycled. Appliances are then sold as metal scrap to metal recycling companies. In the near future, it is expected that all large metallic items will be recovered and diverted to a recycle market.

2.4 REGIONAL SOLID WASTE DISPOSAL NEEDS

1. While regulatory requirements will serve to reduce the rate of decline in landfill disposal capacity in southern California and the rest of the state, it does not eliminate the need for new long-term landfill capacity. Similarly, expansion of existing landfills and siting of new landfills in urban areas of southern California may alleviate short-term requirements for landfill capacity but may not provide a long-term solution to regional v disposal requirements. Land for expansic existing landfills and siting of new landfil urban southern California is limited. recognized by the Southern California Associ of Governments (SCAG), a waste-by-rail sy to a large capacity landfill in the desert regi southern California may provide a portion o long-term landfill capacity required by the re (SCAG, 1988).

2. Based on the above factors, Rail•Cycle propos develop the Bolo Station Landfill, with supporting waste-by-rail system, to meet a po of the long-term landfill capacity for sout California. The Bolo Station Landfill w provide cities and counties in southern Calif with long-term options for disposal of portio their waste stream remaining after the so reduction and recycling mandates of AB 93 met. Bolo Station Landfill does not represe total solution to the mandates of AB 939, bu joint operation with MRFs and its long-t landfill capacity is intended to provide a vi long-term option to assist cities and countie southern California in achieving regula objectives.

3. Table 2.4 summarizes the effect of the propo Bolo Station Landfill on alleviating the proje Los Angeles County daily disposal capa shortfall delineated previously in Tables and 2.3. As shown in Table 2.4, if the I Station Landfill were permitted as proposed began accepting only Los Angeles County w in 1994 at a rate of 3,000 tons per day (the fi used by Rail•Cycle as the minimum star disposal rate for planning purposes) and if no sources are developed in Los Angeles County, county would continue to experience a shortfa landfill capacity. If the proposed, reasona foreseeable expansions to existing Los Ang County landfills were approved, as itemize Table 2.3, and if Bolo Station were to accept Los Angeles County waste, there would not b shortfall in disposal capacity until 2014, bu large capacity landfill becomes critical by 2 when the Sunshine Canyon facility would cl The Bolo Station Landfill, however, is designe serve the entire southern California region, just the metropolitan Los Angeles County a currently approaching a landfill disposal shortfa

4. These projections, when considered in the con of the regional solid waste disposal capacity ne outlined by CIWMB and others, indicate a need additional landfill capacity on the order of proposed for the Bolo Station Landfill.

PROPOSED BOLO STATION LANDFILL
EFFECT ON METROPOLITAN LOS ANGELES COUNTY PROJECTED SOLID WASTE DISPOSAL CAPACITY/SHORTFALL[1]

YEAR	BOLO STATION DAILY TONNAGE (estimated)[2]	CURRENT LOS ANGELES COUNTY PERMITTED CAPACITY		LOS ANGELES COUNTY CAPACITY IF LANDFILL EXPANSIONS APPROVED[3]	
		Estimated Los Angeles County Daily Waste Shortfall (from Table 2.2)	Los Angeles County Shortfall After Maximum Diversion to Bolo Station	Estimated Los Angeles County Daily Waste Shortfall (from Table 2.3)	Los Angeles County Surplus/Shortfall After Maximum Diversion to Bolo Station
1994	3,000	(9,064)	(6,064)	8,936	11,936
1995	6,000	(21,764)	(15,764)	(3,764)	2,236
1996	9,000	(23,453)	(14,453)	(5,453)	3,547
1997	15,000	(30,133)	(15,133)	(12,133)	2,867
1998	21,000	(28,252)	(4,252)	(10,252)	10,745
1999	21,000	(28,745)	(7,745)	(10,745)	10,255
2000	21,000	(26,608)	(5,608)	(8,608)	12,392
2001	21,000	(26,874)	(5,874)	(8,874)	12,126
2002	21,000	(27,142)	(6,142)	(9,142)	11,858
2003	21,000	(27,415)	(6,415)	(9,415)	5,585
2004	21,000	(27,688)	(6,688)	(15,688)	5,312
2005	21,000	(27,965)	(6,965)	(15,965)	5,035
2006	21,000	(28,244)	(7,244)	(16,244)	4,756
2007	21,000	(28,527)	(7,527)	(16,527)	4,473
2008	21,000	(28,812)	(7,812)	(16,812)	4,188
2009	21,000	(29,100)	(8,100)	(17,100)	3,900
2010	21,000	(29,391)	(8,391)	(17,391)	3,609
2011	21,000	(29,685)	(8,685)	(17,685)	3,315
2012	21,000	(32,445)	(11,445)	(20,445)	555
2013	21,000	(34,841)	(13,841)	(22,841)	(1,891)
2014	21,000	(35,190)	(14,190)	(35,190)	(14,190)

91-109 (8/25/93/dh)

(1) Disposal capacity or shortfall is expressed in tons per day.
(2) Daily tonnage estimates for Bolo Station are those proposed by project proponent for planning purposes and could vary.
(3) Assumes Puente Hills, Sunshine Canyon, and BKK landfill expansions are permitted as proposed (Los Angeles County, 1993).

5. In addition to Rail•Cycle, two other large waste-by-rail municipal solid waste landfill projects propose to transport waste from urban southern California to new large Class III landfills proposed for construction in rural areas of the southern California desert region. These projects are briefly described below:

   - **Eagle Mountain Landfill.** Located in northeastern Riverside County, this project is proposed by Mine Reclamation Corporation and involves conversion of an abandoned open pit iron ore mine previously operated by Kaiser Steel Corporation into a Class III landfill. The proposed landfill would be located on approximately 2,300 acres (additional area would be required for support facilities and buffer zone) and would have a capacity of 700 million tons over an estimated 115-year operational life.

     At full operation, the landfill would be designed to accept up to 20,000 tons of solid waste per day from throughout southern California.

     Draft and Final EIR/EISs were prepared and distributed by Riverside County and BLM for this project. The Riverside County Board of Supervisors certified the EIR/EIS in October 1992 and approved a general plan amendment, rezoning, and provision for a Specific Plan, in addition to issuing a CUP. Applications for the Eagle Mountain Landfill have been submitted to the Regional Water Quality Control Board (RWQCB) for Waste Discharge Requirements (WDRs), and to Riverside County and CIWMB for a Solid Waste Facilities Permit (SWFP). It is expected that it could take up to 12 to 15 months for these permits to be issued.

     Timing of the Eagle Mountain project is complicated, however, by two issues: (1) a request from CIWMB that the applicant prepare a supplemental EIR to address ground water issues in support of review of the SWFP; and (2) two lawsuits filed against Riverside County alleging that the Eagle Mountain EIR/EIS is deficient.

   - **Mesquite Regional Landfill.** Located in southeastern Imperial County, this project is proposed by California InterRail Corporation and involves construction of a Class III landfill near an active open pit gold mine. The proposed landfill would be located on approximately 2,500 acres (additional area would be required for support facilities and buffer zones) and would have a capacity of 600 million tons over a 100-year operational life. At full operatio the landfill would be designed to accept up to 20,000 tons per day of solid waste fro throughout southern California. A Draft EIR/EIS is currently being prepared by Imperial County and BLM for this projec

6. Another large waste-by-rail landfill proposed receive solid waste from southern California been permitted near the City of Carbon in Carb County, Utah. This facility, owned by the E Carbon Development Corporation, is activ seeking disposal commitments from wit California. East Carbon is reportedly seekin commitment for residual waste from the Pue Hills Landfill to divert up to 4,000 tons per day solid waste that has undergone reduction a recycling at a MRF. The East Carbon Landf has an estimated daily capacity of 40,000 tons.

7. With the exception of the East Carbon Landf other major waste-by-rail landfills that could ser southern California have not currently be permitted and may not be approved a constructed. Therefore, it would be speculative this time to try to determine what portion southern California's solid waste disposal shortf each of these proposals, including the propos Bolo Station Landfill, might share. Neverthele as the preceding discussion has shown, the ne for additional landfill capacity in southe California support the development of larg regional landfills with high daily disposal capaci and lengthy permit lives, such as the propos action.

8. In addition to four large waste-by-rail landfill two smaller landfills that have the potential receive waste-by-rail have been recently approve One of the smaller landfills known as the Camp Landfill (designed to receive up to 3,000 tons p day) received approval from the federal governme to operate on lands owned by the Campo Indi Reservation in San Diego County. Complicate routing and transportation issues may limit th service area for this project to Imperial an San Diego counties. The other small landfill s is located near Franconia, Arizona and is owned b WMNA. Landfill construction has not bee initiated at this site; however, conceivably, th site could be developed in approximately six t seven months. While both of these sites cou potentially take waste that could otherwise go t one of the larger waste-by-rail landfills, thes smaller landfills do not represent a feasib alternative as they do not have the capability t handle 20,000 tons of waste per day.

CHAPTER 3.0
PROPOSED ACTION AND ALTERNATIVES

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 OVERVIEW OF THE PROPOSED ACTION AND WASTE-BY-RAIL SYSTEM

3.1.1 PROPOSED ACTION

The proposed Bolo Station Landfill is a private venture by Rail•Cycle, a limited partnership between ATSF and WMNA. Initial operations of the Class III landfill would begin with approximately 3,000 tons of waste per day and are anticipated to increase to 21,000 tons per day after approximately five years. Waste would be transported over existing rail lines to an onsite offloading facility that would be constructed as an element of the proposed action. Provisions are also included in the proposed action for accepting waste from local desert communities delivered to the site by truck.

The landfill is proposed to be located at an area known as Bolo Station adjacent to an ATSF rail line between the towns of Amboy and Cadiz, in San Bernardino County, California. As shown in Figure 1.2, the Bolo Station site encompasses approximately 4,870 acres. Of this total, 2,100 acres would be allocated to the actual landfill; and an additional 300 acres for support facilities. The remaining 2,470 acres would be a buffer area to the landfill. Of the 4,870 acres, 3,270 acres are owned by ATSF and/or Rail•Cycle (Sections 5, 9, 16, 17, 21 and 70 acres of Section 33), and 1,600 acres are federal lands managed by BLM (Sections 8, 15, and the western one-half of 22).

3.1.2 WASTE-BY-RAIL SYSTEM

The proposed action is comprised of two components: (1) the rail transport of waste in sealed containers using existing rail lines; and (2) disposal of solid waste at the proposed Bolo Station Landfill.

Rail•Cycle's waste-by-rail system would obtain waste from approved MRFs. The MRFs are not part of this proposed action and are not discussed in detail. Site-specific permitting and approval, including CEQA compliance, would be conducted for each MRF.

While not part of the proposed action, up to seven MRFs in southern California may support Rail•Cycle. These MRFs would assist the waste-generating communities in meeting their AB 939 waste reduction requirements. MRFs that may support the Rail•Cycle system are anticipated to be located adjacent to existing rail lines.

4. Each potential MRF would function as an intermodal waste transfer facility that would accomplish a number of tasks preparatory to waste being processed for rail transport to the proposed landfill. Processing tasks that would be accomplished at the MRFs include:

   - Inspection of incoming waste for hazardous and/or nonpermitted waste.
   - Separation of recyclable commodities and, potentially, green waste from the waste stream.
   - Storage and transport of recyclable commodities (including, but not limited to: aluminum, plastic, cans, paper, cardboard, and glass) to markets.
   - Compaction of nonrecyclable (residual) waste and green waste.
   - Weighing of waste and recyclables.
   - Loading of containers of residual waste onto rail cars for transport to the landfill.

3.2 CHANGES TO THE PROPOSED ACTION

1. This section provides an overview of changes to the proposed action that have occurred since the distribution of the Draft EIR/EIS. These changes reflect:

   - Engineering refinements associated with design of the landfill.
   - Refinements made in response to comments on the Draft EIR/EIS.
   - Refinements made by Rail•Cycle in response to mitigation measures included in the Draft EIR/EIS.

3.2.1 PROPOSED SITE BOUNDARY

1. The proposed site was defined in Section 3.2.1 of the Draft EIR/EIS as consisting of 4,800 acres. In June 1993, Rail•Cycle purchased property that included approximately 70 acres of land to be added to the proposed site from the Catellus

Development Corporation. The land is located between the northern boundary of the proposed site and the southern side of Route 66 (see Figure 1.3). These 70 acres are a portion of Section 33 in Township 6 North, Range 13 East, San Bernardino Baseline and Meridian. The additional 70 acres increase the total size of the proposed site to 4,870 acres.

2. The Draft EIR/EIS included an approximate 800- by 2,640-foot right-of-way across federal lands as part of the proposed action to provide access to the site from Route 66. By purchasing and including the 70 acres of Section 33 in the proposed action, Rail•Cycle has direct access to Route 66. The access road for the proposed landfill would be constructed across a portion of the 70 acres added to the proposed site.

3. In addition to providing direct access to Route 66, a portion of the 70-acre strip of land bordering Route 66 would be used to construct a new County fire station. As a result of discussions with the County Forestry and Fire Warden Department and to comply with a mitigation measure in the Draft EIR/EIS, Rail•Cycle would construct a new County fire station at the entrance to the proposed landfill. The proposed location of the new County fire station is shown in Figure 3.1.

4. The 70-acre strip of land included in the proposed site also provides Rail•Cycle with an opportunity to relocate the proposed onsite water wells that would supply the proposed action. Prior to inclusion of the 70 acres of Section 33, Rail•Cycle had proposed to install two side-by-side onsite water wells at the northeast corner of Section 9. With the inclusion of the 70 acres, the onsite water wells would be located in the southeast corner of Section 33 immediately south of Route 66, as shown in Figure 3.1.

5. Relocation of the onsite water wells to Section 33 serves the following purposes:

   - Reduces the length of the water main from the wells to the proposed 500,000-gallon aboveground storage tank to be located near the administration/visitor's center (see Figure 3.1 for the location of the aboveground storage tank). To supply water to the aboveground storage tank from the northeast corner of Section 9 would have required 11,000 feet of water main a compared to 7,000 feet from the southeas corner of Section 33.

   - Minimize the impacts associated with providing access to the well sites and construction of the water main. Access to the southeast corner of Section 33 is via Route 66. To provide access to the northeast corner of Section 9 would have required the construction of a dirt road.

   - Provide a greater separation between the proposed onsite wells and the Cargill Salt Company (Cargill) wells located near the southwest corner of the proposed site.

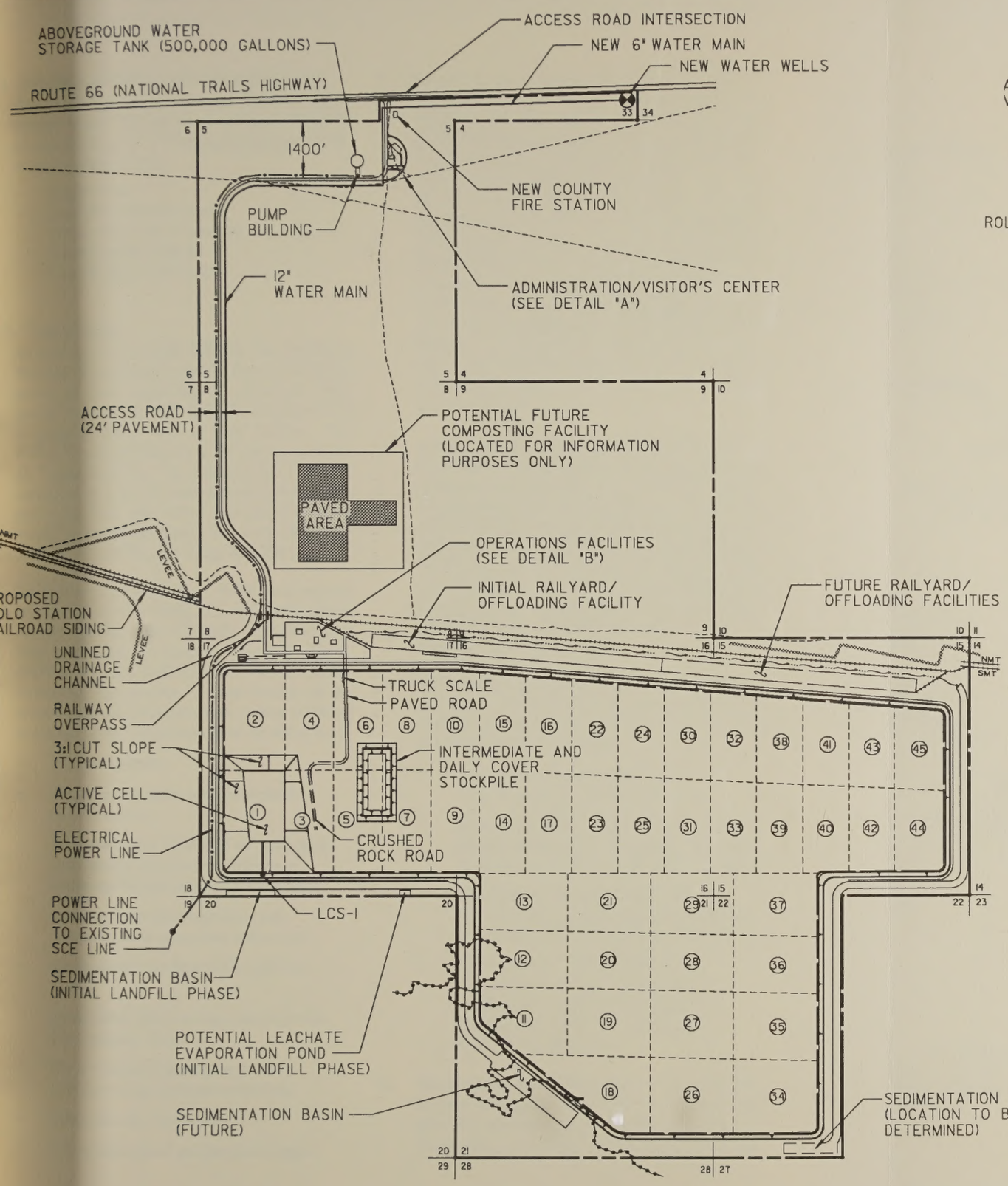
6. Potential impacts to ground water quantity a flow from the relocation of the onsite wells Section 3.3 are discussed in Section 5.2 of t Supplement.

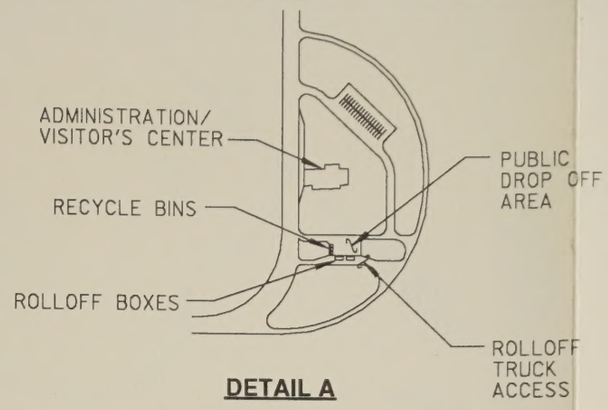
3.2.2 LANDFILL SUPPORT FACILITIES

1. The location of the administrative/ visitor's cent public waste dropoff facility, and the configurati of the operations and maintenance area has be refined since distribution of the Draft EIR/EIS (s Figure 3.1 for location of the landfill suppo facilities). These refinements do not result changes to the environmental impacts addressed the Draft EIR/EIS.

3.2.3 LANDFILL FOOTPRINT

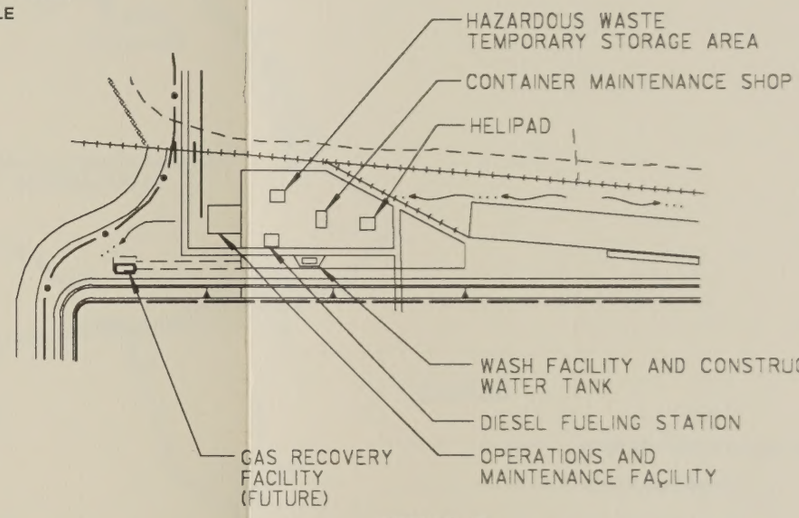
1. The landfill footprint design has been refined sin distribution of the Draft EIR/EIS. The refin footprint of the 2,100-acre landfill is divided in 45 landfill cells as shown in Figure 3.1. T comply with a mitigation measure in the Dra EIR/EIS, the southwest corner of the landfill h been reconfigured to remove the majority landfill cells from the 100-year floodplain shown in Figure 3.1. Engineered berms would b constructed on the perimeter of the landfill adjace to Landfill Cell Nos. 11, 12, and 18 to protect th small portion of these cells that are still withi the 100-year floodplain. The combination reconfiguration of landfill cells and engineere berms for protection from a 100-year flood reflec a balance between a design solution and the cost constructing a berm.





DETAIL A

ADMINISTRATION/VISITOR'S CENTER
AND PUBLIC DROP OFF AREA
NOT TO SCALE



DETAIL B

OPERATIONS FACILITIES
NOT TO SCALE

LEGEND

- PROJECT AREA BOUNDARY
- ATSF RAILROAD
- EXISTING RAILROAD LEVEE
- UNLINED DRAINAGE CHANNEL
- PROPOSED LIMIT OF FILL
- EXISTING DIRT ROAD
- ELECTRICAL POWER LINE
- 100-YEAR FLOODPLAIN (CORRESPONDS TO THE 620' CONTOUR)
- 20/21 29/28 SECTION CORNER
- NMT ATSF NORTH MAIN TRACK
- SMT ATSF SOUTH MAIN TRACK

NOTES

1. FINAL DESIGN WILL INCLUDE BERMS/DIKES ADJACENT TO CELLS 11, 12, AND 18 TO PREVENT INUNDATION OF THESE CELLS BY A 100-YEAR FLOOD.
2. ADDITIONAL SEDIMENTATION BASINS WILL BE CONSTRUCTED ON THE PERIMETER AS PART OF THE LATER PHASES OF THE LANDFILL.
3. THE LOCATIONS OF THE LEACHATE EVAPORATION PONDS AND SEDIMENTATION BASINS HAVE BEEN REFINED SINCE THE DISTRIBUTION OF THE DRAFT EIR/EIS.

0 2,500 5,000 FEET
SCALE

FIGURE 3.1

REFINED PLAN VIEW BOLO STATION SITE

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

FERENCE: WMNA, 1991a, FACILITIES, SHEET NO. 8; RUST, 1993C, DRAWING NO. 1.

ONSITE LANDFILL CONTROL SYSTEMS

Design refinements to the onsite landfill control systems since distribution of the Draft EIR/EIS are discussed in the following paragraphs. These refined systems include:

- Landfill liner
- Leachate collection system
- Surface water run-on controls
- Landfill runoff controls
- Landfill gas control system

1. Landfill Liner

As discussed in the Draft EIR/EIS, the California Regional Water Quality Control Board (RWQCB) raised an issue regarding the minimum liner system required by CCR Title 23 and Subtitle D at "mega-landfills" such as Bolo Station. The RWQCB indicated that due to the long-term nature of "mega-landfills," an alternate liner system consisting of a double containment system, composite clay liner, and vadose zone gas monitoring would be required as part of the waste discharge requirements (WDRs) for "mega-landfills."

To respond to this concern, Rail•Cycle entered into discussion with RWQCB, Local Enforcement Agency (LEA) and CIWMB regarding the liner system for the proposed landfill. Since distribution of the Draft EIR/EIS, Rail•Cycle has refined the liner system. A cross section of the proposed double composite liner system is shown in Figure 3.2 and would consist of the following:

- Prepared subbase.
- Unsaturated (vadose zone) monitoring (UZM) system.
- 60-mil (a mil is 1/1,000 of an inch) thick high density polyethylene (HDPE) or equivalent flexible liner (secondary liner).
- Geonet synthetic drainage layer and collection sump (secondary collection).
- Geosynthetic clay liner (GCL) (primary liner).
- 60-mil thick HDPE or equivalent flexible liner (primary liner).
- Geonet synthetic drainage layer and collection sump (primary collection).
- Geotextile silt filter layer.
- 2-foot thick native soil protective layer.

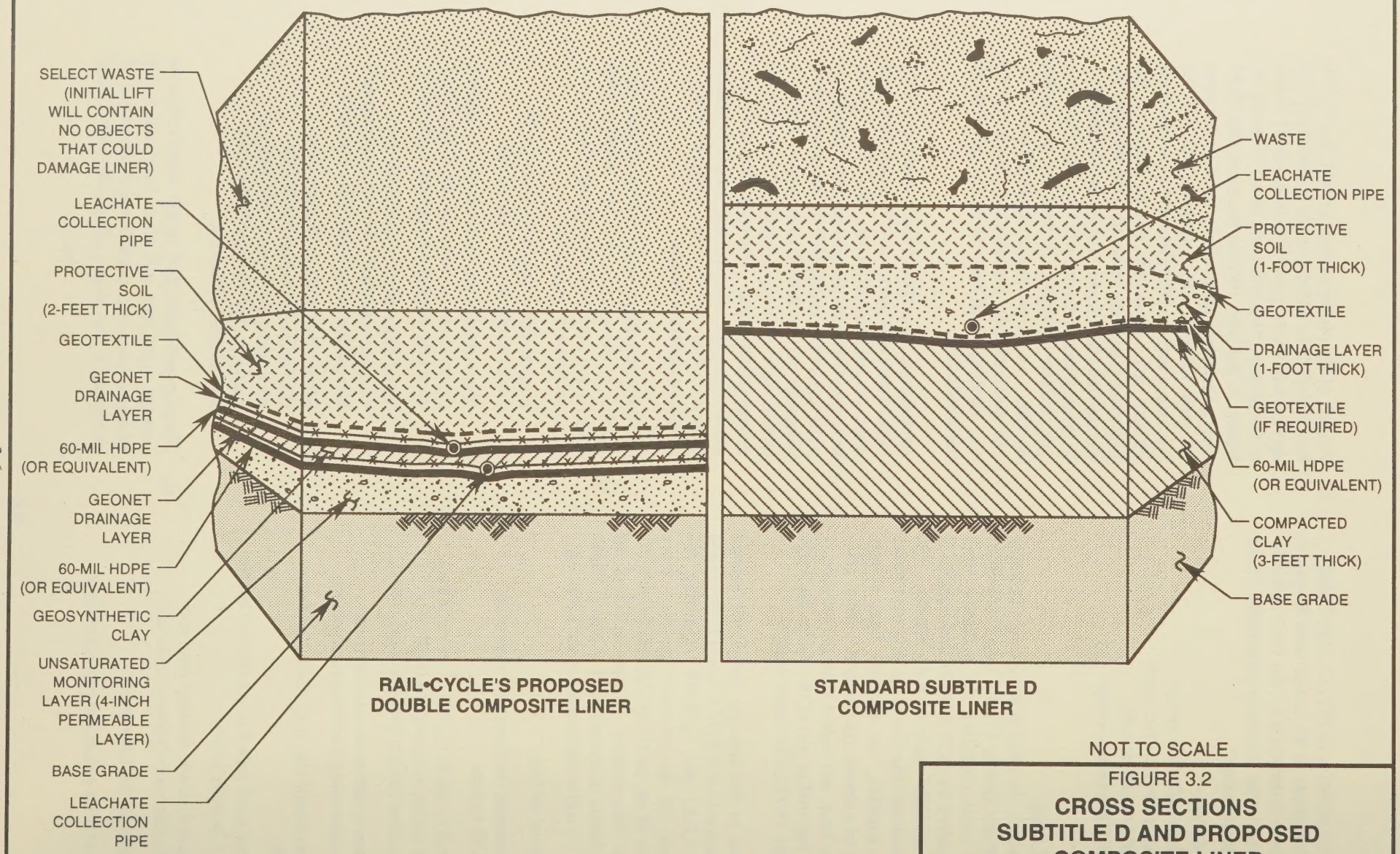
3. As part of the proposed liner system, Rail•Cycle has included an UZM system consisting of an approximate 4-inch permeable layer placed on top of the prepared base grade and directly beneath the bottom of the liner. Within the permeable UZM layer a perforated pipe will run beneath the center of each landfill cell. Ambient air will be introduced into the UZM layer from the perimeter of each cell. A vacuum will be drawn on the perforated pipe in the center of UZM sweeping air through the UZM layer. The air will be collected in the perforated pipe and will be passed through a gas analyzer sampling for methane and carbon dioxide. As the primary components of landfill gas, monitoring for methane and carbon dioxide will detect potential leaks of landfill gas through the landfill liner.

4. As designed, the proposed UZM system provides, for all intent and purposes, 100 percent coverage under the entire landfill liner. The UZM system, in conjunction with the ground water monitoring wells that will be installed along the downgradient perimeter of the landfill, will assure that if a release were to occur, it would be detected at the earliest possible time. This early detection would allow for the immediate implementation of appropriate verification analysis and, if necessary, corrective action.

5. The Rail•Cycle proposed double liner system has a number of advantages over the baseline CCR Title 23 and Subtitle D liner system discussed in the Draft EIR/EIS, including:

   - A secondary containment system in the event the primary liner should fail.
   - Elimination of the water required to establish the optimum moisture content in the 3-foot thick clay layer that is replaced by the GCL.
   - Significant reduction in fugitive dust emissions associated with the spreading and compaction of the 3-foot thick clay layer.
   - Elimination of up to 80 truck trips (132 miles round trip) per day for six months every one to two years to transport clay from the Rheox Mine near Hector, California.

6. The proposed double liner system would reduce the impacts associated with liner construction and provides increased ground water protection as compared to the single composite liner system



NOT TO SCALE

FIGURE 3.2

CROSS SECTIONS SUBTITLE D AND PROPOSED COMPOSITE LINER

RAIL•CYCLE
BOLO STATION LANDFILL

addressed in the Draft EIR/EIS. Therefore, the iner-related impacts discussed in the Draft EIR/EIS are considered conservative.

Since distribution of the Draft EIR/EIS, geotechnical investigations at the proposed site have determined that suitable clay materials (i.e., a permeability of $1x10^{-7}$ cm/sec or less) for the 3-foot thick compacted clay layer, and gravel for the drainage layer are not available onsite. The currently permitted Rheox Mine near Hector, California, has been identified as a source of clay that would be able to provide the approximate 13.5 million cubic yards of clay required for the landfill. Similarly, an existing, permitted borrow site near Newberry Springs, California, has been identified as a source of gravel that would be able to provide the approximate 3.4 million cubic yards of gravel required for the landfill.

For purposes of the Draft EIR/EIS and this Supplement, it is assumed that the clay, if required for the liner system, would come from the Hector Rheox Mine and gravel from Newberry Springs. However, Rail•Cycle intends to procure the required clay and gravel through a competitive contract and other sources may be utilized. To be awarded a contract, the source will be required to be an approved mining/ borrow area with appropriate permits and licenses.

42 Leachate Collection System

As discussed in the Draft EIR/EIS, it is the intent of Rail•Cycle to reintroduce collected leachate and landfill gas condensate into the solid waste compacted at the landfill working face. Reintroduction of leachate has been approved at other landfills by the RWQCB, various LEAs, and the CIWMB. Reintroduction of collected leachate is proposed by Rail•Cycle as an alternative to the construction of double-lined leachate evaporation ponds on the perimeter of the landfill.

In the event reintroduction of leachate is not approved, leachate evaporation ponds would be constructed at Bolo Station. Figure 3.1 shows the location of the initial leachate evaporation pond should it be required. This pond would be sized to collect leachate from Landfill Cell Nos. 1 to 10. Additional leachate evaporation ponds would be constructed at other points on the landfill perimeter as required to manage the leachate potential generated by subsequent landfill cells.

3. Up to four ponds could potentially be developed for the landfill facility. If required, the ponds would be constructed in phases, with one pond being constructed during the initial construction period and the other three being constructed on an as-needed basis.

4. If leachate evaporation ponds are required, they would be lined to prevent leachate from migrating from the ponds. The standard composite liner system and an equivalent liner system being proposed by Rail•Cycle for the ponds is shown in Figure 3.3. The proposed liner system would consist of the following:

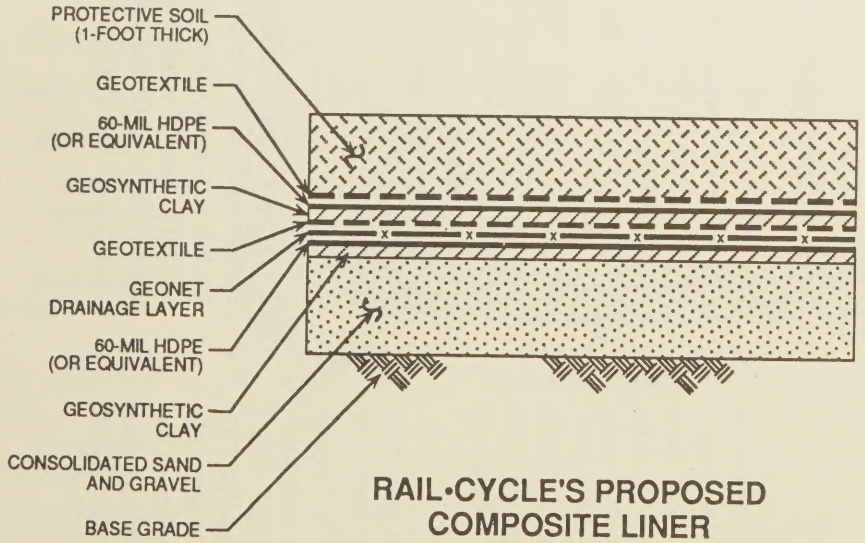
   - A 12-inch base layer consisting of consolidated gravel and sand.
   - A secondary GCL.
   - A secondary 60-mil thick HDPE or equivalent flexible membrane liner overlaid with a protective geotextile.
   - A geonet drainage layer with a leachate collection system. Geotextile will overlay the geonet layer.
   - A primary GCL.
   - A primary 60-mil thick HDPE or equivalent flexible membrane liner overlaid with geotextile.
   - A 12-inch layer of protective soil.

5. The leachate collection system between the primary and secondary flexible membrane liner would act as a monitor in the event the primary liner is damaged. In the event of damage, the primary liner would be repaired.

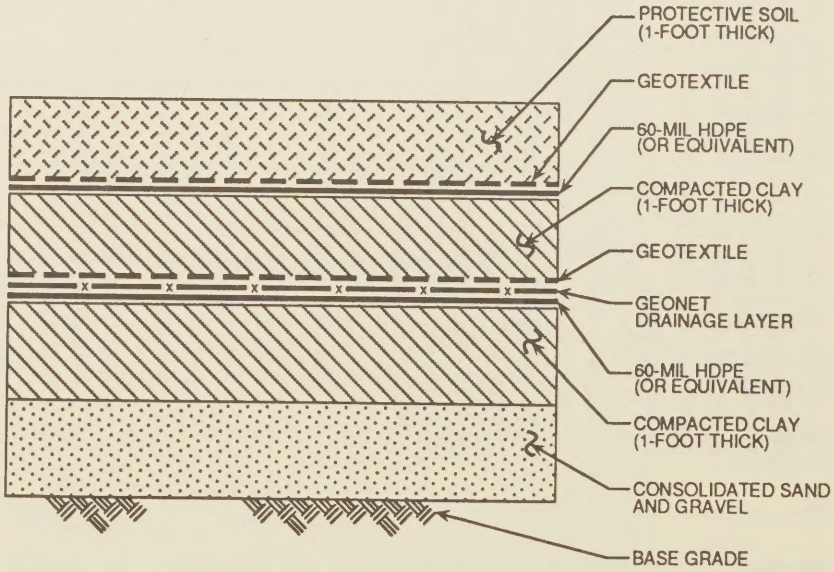
6. Should the RWQCB, LEA, and CIWMB not approve reintroduction of leachate into the solid waste at the working face, the final design for the leachate evaporation ponds would require the approval of these agencies. This would include approval of the proposed composite liner system for the ponds.

3.2.4.3 Drainage Control System

1. Based on refinement of the design of the proposed landfill and to respond to comments on the Draft EIR/EIS, various stormwater run-on and runoff control features at the site would be designed, constructed and maintained for the 100-year,



RAIL•CYCLE'S PROPOSED
COMPOSITE LINER



STANDARD
COMPOSITE LINER

NOT TO SCALE

FIGURE 3.3
CROSS SECTIONS
STANDARD AND PROPOSED
COMPOSITE LINER
LEACHATE EVAPORATION PONDS
RAIL•CYCLE
BOLO STATION LANDFILL

NOTE: LEACHATE EVAPORATION PONDS MAY NOT BE REQUIRED IF, AS PROPOSED BY RAIL•CYCLE, LEACHATE IS PERMITTED TO BE REINTRODUCED INTO THE

4-hour storm rather than for the 25-year, 24-hour orm as stated in Section 3.3.2.1.4 of the Draft IR/EIS.

Landfill Gas Collection System

his section provides additional information garding the landfill gas flare/energy recovery acility proposed for the landfill. As discussed in e Draft EIR/EIS, the landfill gas collection ystem for the proposed landfill would be designed s an active gas collection system. It would tilize mechanical blowers to create a pressure radient to maximize the extraction of landfill gas. he landfill gas collection system would be esigned to limit the migration of gas.

ne landfill gas flare would be installed when the ndfill gas collection system begins to produce fficient volumes of gas to make operation of a are practical. Based on anticipated waste olumes and projected landfill gas generation rates, fficient volumes of landfill gas are expected to e generated within three to five years of the start f landfilling operations. The flare would be the rst piece of equipment at the proposed landfill at would require a permit from the Mojave esert Air Quality Management District MDAQMD).

he flare would be located at the northwest corner f the landfill area adjacent to Landfill Cell No. 2 see Figure 3.1 for the location of Cell No. 2). he specific location of the flare would be etermined during final design and engineering of e landfill gas collection system.

he flare would have a design and permitted apacity sufficient to handle the volume of landfill as that would be generated on a daily basis hrough the initial 10 to 12 years of landfill perations. After 10 to 12 years, Rail•Cycle rojects that sufficient volumes of landfill gas hould be available to allow for efficient energy ecovery, and an appropriate energy recovery acility would be designed, permitted (including an ppropriate CEQA analysis), and constructed. As he time period for an energy recovery facility is 0 to 12 years after the proposed landfill begins ccepting waste, it would be speculative at this ime to discuss the details of the facility that could e installed. Rail•Cycle would use the best vailable technology in consultation with the MDAQMD, County Planning Department, LEA, nd CIWMB.

5. The initial flare would be retained after installation of the energy recovery facility for emergency and overload conditions. Additional backup flares would be added as required to assure emergency capacity in the event of disruption in the operation of the energy recovery facility.

3.2.5 FIRE/PARAMEDIC/SHERIFF STATION

1. To comply with a mitigation measure in the Draft EIR/EIS, Rail•Cycle would construct a new County fire/paramedic/sheriff station at the entrance to the proposed landfill (see Figure 3.1). According to the County Forestry and Fire Warden Department, the new County fire station would be staffed by one County firefighter/paramedic on a 24-hour, seven day per week basis and would be supported by paid-call volunteers from the Amboy-Cadiz Community (Miller, 1993). Provision for the fire station and equipment facilities would be in coordination with the County Forestry and Fire Warden Department. Training for County firefighters would include hazardous materials (HAZMAT) first responders.

2. Based on requirements of the County Forestry and Fire Warden Department, fire fighting equipment located at the new station may include a fire engine, water tender, and rescue equipment. In compliance with the County Fire Code, 180,000 gallons of water would be reserved onsite in the aboveground storage tank to be located near the administration/visitor's center (see Figure 3.1). The size of the aboveground storage tank has been reduced to 500,000 gallons from 600,000 gallons as described in the Draft EIR/EIS. This reduction in storage capacity is based on refined requirements from the County Forestry and Fire Warden Department for capacity in excess of the 180,000 gallon required for fire protection.

3.2.6 WATER REQUIREMENTS AND SUPPLY

1. Anticipated water demands for construction and operation of the proposed facilities have been refined since distribution of the Draft EIR/EIS and are provided in Table 3.1. The revised onsite water requirements are as follows:

   - During the eight-month initial construction period, approximately 300 acre-feet of water will be required. This is an increase of approximately 250 acre-feet over what was estimated in the Draft EIR/EIS (i.e., 53.08 acre-feet).

TABLE 3.1

REVISED WATER DEMAND

INITIAL CONSTRUCTION[1]				OPERATIONS							
				3,000 Tons Per Day[2]				21,000 Tons Per Day[2]			
Peak Demand (gallons per minute)	Average Daily Demand (gallons per day)	Initial Construction Demand (million gallons)	Initial Construction Demand (acre-feet)	Peak Demand (gallons per minute)	Average Daily Demand (gallons per day)	Average Annual Demand (million gallons)	Average Annual Demand (acre-feet)	Peak Demand (gallons per minute)	Average Daily Demand (gallons per day)	Average Annual Demand (million gallons)	Average Annual Demand (acre-feet)
1,400	435,000	97.44	298.89	80	16,445	6.0	18.4	80	115,200	42.04	128.98

91-109 (8/23/93/rmm)

(1) The anticipated water demand for the initial 32-week (8 months) construction phase is delineated in these columns and based on seven working days per week.

(2) Includes all water requirements for operations (including the periodic construction of subsequent landfill cells) and fire protection. County Fire Code requires 1,500 gallons per minute for two hours = 180,000 gallons for fire reserve storage.

- At full operations (21,000 tons per day) the average annual onsite water requirement will be approximately 130 acre-feet. This is an increase of approximately 50 acre-feet over what was estimated in the Draft EIR/EIS (i.e., 82.77 acre-feet).

As discussed in Section 5.4 of the Draft EIR/EIS, the Bristol Basin aquifer may be in overdraft due to the use of approximately 5,000 acre-feet per year by the Cadiz Land Company. While the onsite water requirement for the proposed action is limited (i.e., 130 acre-feet per year during operation), this use of water by the proposed action is considered an unavoidable adverse impact. The impact from the increased onsite water requirement is discussed in Section 5.2 of this Supplement.

As discussed in Section 3.2.1 of this Supplement, the location of the proposed onsite wells has been refined since distribution of the Draft EIR/EIS. Rather than locating the wells at the northeast corner of Section 9, Rail•Cycle proposes to locate the wells on the 70 acres of Section 33 that was recently acquired by Rail•Cycle to be included as part of the proposed site.

Water would be pumped from the wells to the proposed 500,000-gallon aboveground storage tank located near the administration/visitor's center. This tank would store water for normal construction and operations as well as the required reserve capacity of 180,000 gallons required by the County Forestry and Fire Warden Department for fire fighting purposes.

FINAL COVER

As landfill cells are completed to final elevation, a minimum of 5-1/2 feet of cover would be placed on the slopes and over the upper surface as follows: a 2-foot thick foundation layer would be capped with 1-1/2 feet of clay or equivalent having a permeability of 1×10^{-7} centimeter per second (cm/sec) or less, which would be covered with 2 to 3 feet of topsoil. The 2 to 3 feet of topsoil represents an increase over the 1 foot of topsoil described in the Draft EIR/EIS. The increase in the thickness of the topsoil layer is in response to comments on the Draft EIR/EIS and has been included to improve revegetation of the landfill with native plant species. A cross section of this refined standard final cover system is depicted in Figure 3.4. This final cover will meet or exceed the requirements of CCR Title 23 and 40 Code of Federal Regulations (CFR), Part 258 Subtitle D.

2. Rail•Cycle is proposing the use of a 40-mil thick HDPE or equivalent flexible membrane layer in place of the 1-1/2 feet of clay in the final cover. A cross section of Rail•Cycle proposed final cover is depicted in Figure 3.4. Use of the flexible membrane or equivalent in the final cover would eliminate the water required to establish the optimum moisture content for the clay layer. Its use would also eliminate importation of the clay to the site and the emissions of fugitive dust associated with the spreading and compacting of the clay liner.

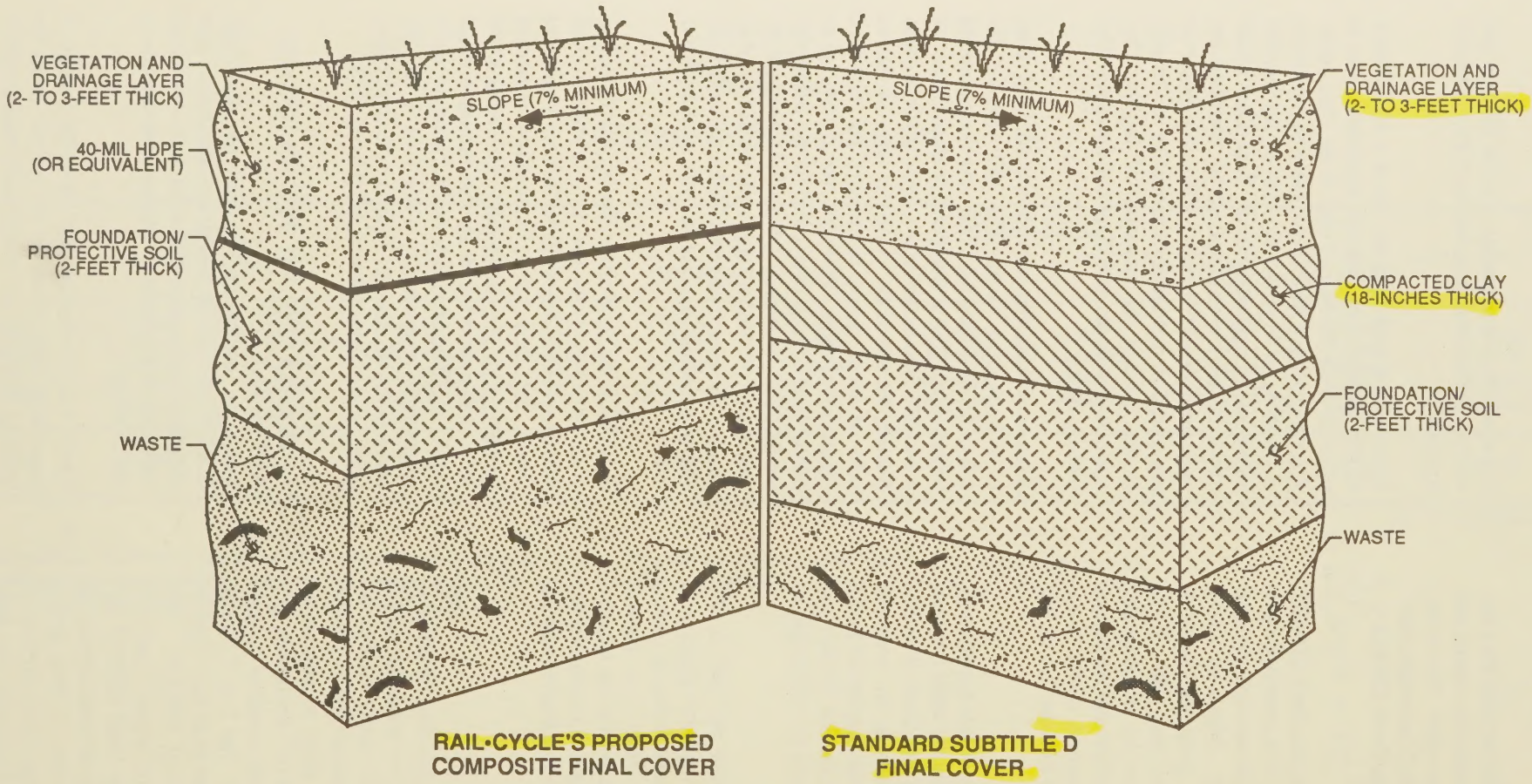
3. The use of a flexible membrane in the final cover is a permitting issue that will involve the RWQCB, LEA, and CIWMB. As the permitting process has not been completed to allow the use of a flexible membrane in the final cover at Bolo Station, the use of the 1-1/2-foot layer of clay as part of final cover represents the standard regulatory method. Therefore, the use of clay as part of final cover is considered for the purpose of the EIR/EIS. However, if Rail•Cycle receives the appropriate permits and approvals for the use of an flexible membrane as part of final cover at Bolo Station, it would replace the use of clay at the site.

4. In refining the final cover, Rail•Cycle consulted with botanists from the U.S. National Park Service's (NPS's) Joshua Tree National Monument Center for Arid Land Restoration regarding revegetation of the closed cells. According to the NPS, native desert plant species require a range from 1 to 3 feet of topsoil for revegetation and it specifically recommends a depth of 3 feet for revegetation of creosote bush, the dominant plant in the existing onsite landscape (Moon, 1993).

3.3 ALTERNATIVES TO THE PROPOSED ACTION

1. Based on comments received on the Draft EIR/EIS, this section provides clarification of how alternatives to the proposed action were developed, evaluated, and selected for detailed consideration in the EIR/EIS.

2. CEQA requires that an EIR, "describe a range of reasonable alternatives to the project or to the location of the project, which could feasibly attain


VEGETATION AND DRAINAGE LAYER (2- TO 3-FEET THICK)
40-MIL HDPE (OR EQUIVALENT)
FOUNDATION/ PROTECTIVE SOIL (2-FEET THICK)
WASTE
SLOPE (7% MINIMUM)
SLOPE (7% MINIMUM)
VEGETATION AND DRAINAGE LAYER (2- TO 3-FEET THICK)
COMPACTED CLAY (18-INCHES THICK)
FOUNDATION/ PROTECTIVE SOIL (2-FEET THICK)
WASTE
RAIL•CYCLE'S PROPOSED COMPOSITE FINAL COVER
STANDARD SUBTITLE D FINAL COVER

NOT TO SCALE

FIGURE 3.4

CROSS SECTIONS SUBTITLE D AND PROPOSED FINAL COVER

RAIL•CYCLE
BOLO STATION LANDFILL

he basic objectives of the project ..." and that hediscussion, "focus on alternatives capable of eliminating any significant adverse environmental effects or reducing them to a level of insignificance" (CEQA Guidelines, Section 15126(d)).

National Environmental Policy Act (NEPA) guidelines regarding alternatives are similar. An EIS must "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 CFR, Chapter V, 1502.14[a]).

The alternatives selection process utilized for this EIR/EIS fulfills CEQA and NEPA criteria. Alternatives selected for study in the EIR/EIS were chosen based on their ability to substantially meet the objectives of the proposed action, which include:

- Development of a new Class III solid waste disposal facility that provides a long-term option to various cities and counties in southern California to meet a portion of their projected demand for municipal solid waste landfill space.
- Providing long-term municipal solid waste landfill capacity in a rural desert setting, so as to: (1) minimize land use compatibility conflicts often faced by landfills sited near residential or other urban areas; and (2) minimize potential environmental impacts, especially in the areas of air and water quality, as these effects would be less likely to occur in an arid environment.

1 SELECTION OF ALTERNATIVES

CEQA and NEPA require that an EIR/EIS evaluate the relative effects of a No Action Alternative. However, beyond the requirement for a No Action Alternative, regulations do not provide specific guidance on the type of alternatives that must be evaluated.

A screening process was conducted as part of Draft EIR/EIS preparation to identify alternatives which could substantially meet the proposed action's objectives and might be capable of reducing significant effects. This screening identified two alternatives in addition to the No Action Alternative which merited detailed analysis:

- Reduced Action Alternative, which would result in a reduced scope of the proposed action at the Bolo Station site.
- Cadiz Valley Alternative site, which would involve constructing the proposed action at another location in the Cadiz Valley.

3.3.2 ALTERNATIVE SITE SELECTION CRITERIA AND METHODOLOGY

1. To identify sites that might be feasible alternatives to the proposed Bolo Station site from within the vast area of southern California desert, the Draft EIR/EIS utilized a three-tiered approach to site selection. First, project-specific siting and operational criteria for a rail-haul regional landfill recommended by Rail•Cycle were reviewed and verified by the County and BLM. These criteria were based on specific siting and operational requirements for Rail•Cycle and include the following:

   - The site must be located in a rural area away from urban areas to minimize impacts to population centers.
   - The site must be located within an arid climate to minimize the potential for precipitation to infiltrate into the landfill.
   - The site's development as a landfill must be compatible with surrounding existing and planned land uses.
   - The site must be of a sufficient area and configuration to provide a minimum of 50 years of solid waste disposal capacity, with an appropriate buffer zone, based on an initial startup volume of 3,000 tons per day and increasing to 21,000 tons per day. Depending on specific site conditions, a minimum of approximately 1,500 to 2,000 acres dedicated to landfilling operations would be required to accommodate projected waste volumes over a 50-year project life, with additional acreage required for support facilities.
   - The site must be no more than approximately 230 rail miles, or require no more than a 24-hour turnaround time, from the majority of Los Angeles County. The maximum desirable one-way distance of 230 miles was determined based on current federal regulations governing train crew hours of service and crew turnaround/layover time.
   - The site must be located along a main rail line, because construction of a rail spur would result in additional significant environmental effects associated with surface disturbance that would not take place under the proposed action, and possible substantial additional costs.

- The site must have direct access to a major highway to support initial site construction, long-term continual landfill development phasing, and operations requirements, including employee access.

Table 3.2 lists each site and evaluates it according to these criteria.

3.3.2.1 Initial Site Screening

1. Based on the criteria above, the initial site selection focused on narrow corridors of land along rail lines in the rural desert areas of Kern, Riverside, San Bernardino, and Imperial counties. Guidance for selecting sites from among these corridors was obtained from a 1988 study by SCAG which evaluated the feasibility of a waste-by-rail system to meet waste disposal requirements of San Gabriel Valley (SCAG, 1988). As part of this 1988 evaluation, SCAG identified nine sites with rail access in the four-county area that, in 1988, were considered potential landfill sites. These sites, shown in Figure 3.5, are:

   - Niland (Imperial County)
   - Tehachapi (Kern County)
   - Blythe (Riverside County)
   - Eagle Mountain (Riverside County)
   - Morongo Indian Reservation (Riverside County)
   - Dunn (San Bernardino County)
   - Hector (San Bernardino County)
   - Oro Grande (San Bernardino County)
   - Amboy (San Bernardino County)

2. In addition, three more potential sites were identified as part of the EIR/EIS evaluation of regional alternatives. These sites, also shown in Figure 3.5, include:

   - Ward Valley (San Bernardino County)
   - Boron (Kern County)
   - Mesquite Mine (Imperial County)

3. Each of these 12 sites was evaluated for feasibility based on Rail•Cycle's basic siting and operational criteria. Sites which could not meet these basic criteria were considered unable to substantially meet the proposed action's objectives and were eliminated from further detailed consideration in the EIR/EIS. Table 3.2 lists each site and evaluates it according to these criteria.

4. As shown in Table 3.2, the majority of the 12 sites were constrained by siting or operational criteria that affected their ability to meet the objectives of the proposed action and/or would result in environmental impacts that would not occur at the proposed project site and that may not be able to be mitigated below a level of significance. For example, the Ward Valley Hector sites were eliminated, in part, becaus their distance from a major highway or rail The increased surface disturbance caused construction of major highways or rail s would result in additional significant effects would not occur at the Bolo Station site.

5. In addition, the Blythe and Ward Valley sites not within the 230 mile, 24-hour turnaround distance from San Gabriel Valley. The Grande site is not far enough removed from u areas; in addition, the Oro Grande, Tehachapi Dunn sites are not large enough to support proposed landfill. Several sites, including Nil Eagle Mountain, Oro Grande, and Mesquite M were eliminated from consideration becaus proposals for separate regional landfill project other applicants and the land could not be expe to be available to Rail•Cycle for purchase development. The Morongo Indian Reserva was eliminated due to the significant amoun time involved with acquisition of the l (estimated to require up to ten years), which w not enable Rail•Cycle to meet its objectiv providing a timely solution to the current s waste disposal needs of southern California c and counties.

3.3.2.2 Second-Tier Site Evaluation

1. As shown in Table 3.2, the Amboy and Bo sites met the basic siting and operational crite and merited further evaluation of site-spec environmental factors. The Amboy site identi in the SCAG report is the approximate locatio the proposed Bolo Station site. To determin there were other suitable sites for a rail-h landfill in this region of the Mojave Deser focused site selection process was conducte identify potential sites within the general a of Amboy. As a result of this process th locales within the San Bernardino County de region were identified for evaluation.

2. The three locales, F, H and I, shown Figure 3.6, represent areas along the ATSF line between Barstow and Amboy which meet basic siting criteria described in Table 3.2 and not limited by one or more of the follow factors:

   - Proximity to the populated areas from Barstow to Newberry Springs.
   - Topographical or geologic features such a steep slopes and lava flows.
   - Steep grades on the ATSF rail line.
   - High ground water or dry lake beds.
   - Jurisdictional boundaries (e.g., Twentynir Palms Marine Corps Base).

WASTE-BY-RAIL POTENTIAL ALTERNATIVE LANDFILL SITES
PRELIMINARY SCREENING ANALYSIS

SITE	CRITERIA							RECOMMENDATION
	On a Major Rail Line	Within 230 Miles/ 24 Hours of San Gabriel Valley	Sufficient Area (>=2,000 acres)	On a Major Highway	Arid Climate	Removed From Urban Areas Conflicting Land Uses	Land Owned by or Available for Acquisition by Rail•Cycle	
Niland	Yes	Yes	Yes	Yes	Yes	Yes	No(1)	Eliminate due to infeasibility of acquisition.
Tehachapi	Yes	Yes	No(2)	Yes	Yes	Yes	N/A	Eliminate from further consideration due to insufficient size.
Blythe	Yes	No(3)	N/A	Yes	Yes	Yes	N/A	Eliminate due to distance.
Boron	Yes	Yes	N/A	Yes	Yes	Yes	N/A	Conduct further site-specific siting and environmental analysis.
Eagle Mountain	Yes	Yes	Yes	Yes	Yes	Yes	No(4)	Eliminate from further consideration due to competing project.
Morongo	Yes	Yes	Yes	Yes	Yes	Yes	No(5)	Eliminate due to unfeasibility of acquisition.
Dunn	Yes	Yes	No(6)	Yes	Yes	Yes	N/A	Eliminate due to insufficient size.
Hector	No(7)	Yes	Yes	No(8)	Yes	Yes	N/A	Eliminate due to distance from a major rail line and highway.
Ward Valley	No(9)	No(10)	Yes	Yes	Yes	Yes	N/A	Eliminate due to distance.
Oro Grande	Yes	Yes	No(11)	Yes	Yes	No(12)	N/A	Eliminate due to insufficient sizes and urban uses.
Mesquite Mine	Yes	Yes	Yes	Yes	Yes	Yes	No	Eliminate due to competing project proposed for same site (and distance?).
Amboy/Cadiz Valley	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Conduct further site-specific siting and environmental analysis.

91-109 (8/24/93/pjh)

N/A = Not available. 1988 SCAG rail-haul feasibility study did not provide consistent information for each site.

(1) Land not owned by Rail•Cycle and preapplication discussion for a rail-haul landfill at this site has been initiated by another applicant with Imperial County.

(2) At 1,050 acres, site would not provide sufficient area for long-term waste disposal operation.

(3) At 300 rail miles from San Gabriel Valley, site exceeds the 230-mile/24-hour turnaround time requirement.

(4) Application for rail-haul landfill at this site submitted by another applicant and precludes purchase by Rail•Cycle.

(5) Timeframe required to complete negotiations for land use (ten years) prohibitive; would not enable project to meet current need for landfill disposal capacity as requested by Los Angeles County.

(6) At 285 acres, site would not provide sufficient area for long-term waste disposal operation.

(7) Site would require approximately six- to ten-mile long rail spur.

(8) Site would require approximately six- to ten-mile long access road.

(9) Site would require approximately five-mile long rail spur.

(10) At 260 rail miles from San Gabriel Valley site exceeds the 230-mile, 24-hour turnaround time requirement.

(11) At 75 acres, site would not provide sufficient area for long-term waste disposal operations.

(12) Area is becoming urbanized and would not be suitable for a regional landfill of the scope of proposed landfill.

Locale G, discussed in the Draft EIR/EIS, has been eliminated due to the lava beds south of Interstate 40 (I-40) that constrain potential development for a regional rail-haul landfill, and eliminates the locale in terms of meeting the siting and operational criteria for the proposed action.

3. Specific factors that limit the use of intermediate areas between the above three potential alternative locales include the following:

- **Alternative Locale I West to Barstow**: Alternative Locale I is located immediately north of I-40. The ATSF rail line is situated north of the interstate. The northern, western and eastern boundaries of Alternative Locale I are dominated by steep slopes. Troy Dry Lake, which has a high water table and seasonal flooding, is located approximately two miles west of the slopes that border Alternative Locale I. A populated area that stretches from Newberry Springs westward to Barstow is located approximately six miles west of Troy Dry Lake. The combination of steep slopes, high water table, and proximity to the populated area from Newberry Springs to Barstow makes the area west of Alternative Locale I not suitable for a rail-haul landfill.

- **Alternative Local I East to Alternative Locale H**: Approximately two miles east of Alternative Locale I, the ATSF rail line crosses under I-40. To meet the criteria of access to a main rail line, the area potentially available for a rail-haul landfill would be located south of I-40. The area between Alternative Locale I and Alternative Locale H south of I-40 is dominated by lava flows that severely limit access to the subsurface and make the area unsuitable for a landfill. At Lavic, the Twentynine Palms Marine Corps Base boundary encompasses the ATSF rail line and extends southward, making this area unavailable for development of a landfill.

- **Alternative Locales H to Alternative Locale F**: Locales H is situated in the Ludlow vicinity. Alternative Locale H is located north of Ludlow and I-40 with the highway situated between the ATSF rail line and this locale.

  The eastern boundary of Alternative Locale H is dominated by steep slopes. East of Ludlow and south of the ATSF rail line, the area is dominated by lava flows that severely limit access to the subsurface, making the area unsuitable for a landfill.

  East of Locale H to Alternative Locale F, the railroad grade is steep. The grade is n suitable for development of rail sidings necessary to support an off-loading facilit Approximately four miles west of Bagdad the boundary of Twentynine Palms Marin Corps Base again encompasses the ATSF rail line and extends south of the rail line, making this area unavailable for development of a landfill.

- **Alternative Locale F to Amboy**: Alternative Locale F is north and east of Bagdad and north of the ATSF rail line. South of Bagdad is the boundary of the Twentynine Palms Marine Corps Base. The northern, western and eastern bounda of Alternative Locale F are dominated by steep slopes, which extend to Amboy. The area from the boundary of Twentynin Palms Marine Corps Base east to Amboy dominated by lava flows and Amboy Crat which severely limit access to the subsurf and make the area unsuitable for development of a landfill.

#3

3.3.2.3 Third-Tier Site Evaluation

1. The second-tier site evaluation identified th locales within the San Bernardino desert regi and four potential alternative sites within Amboy/Cadiz Valley that met the basic sit and operational criteria for Rail•Cycle. Th sites, A, B, C and D, are shown in Figure 3.6.

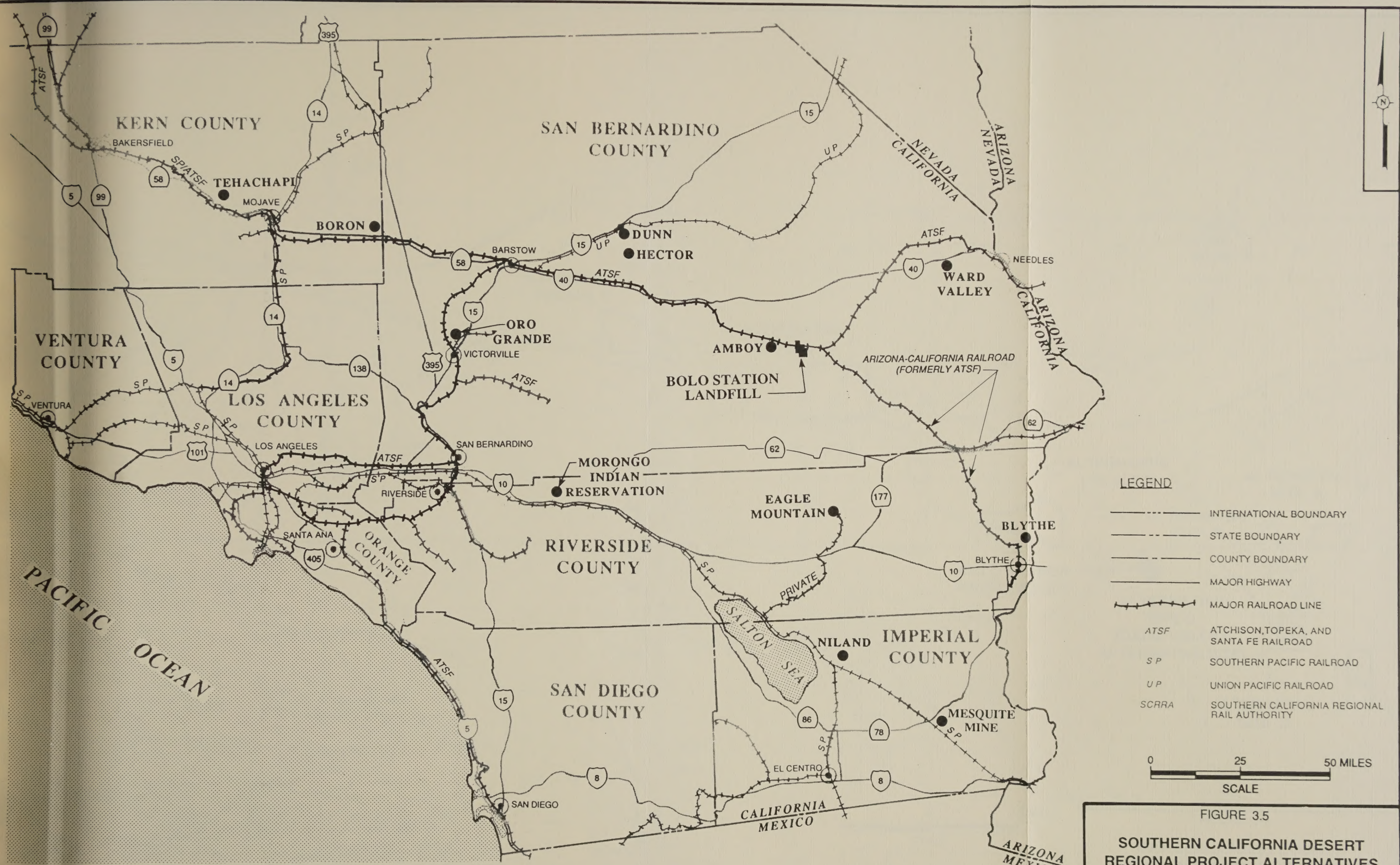
Boron not shown in Fig 3.6

2. The three alternative locales and four alternat sites were evaluated, along with the Boron s according to the following siting and desi criteria associated with federal, state and lo regulatory requirements:

All of which not happen to be on ATSF

- Land use compatibility including conflicts with lands designated for protection under proposed California Desert Protection Act
- Biological resources, including impacts to sensitive plant and wildlife species.
- Water resources, including surface and ground water.
- Geologic resources, including seismic and topographic characteristics.

Table 3.3 summarizes the evaluation of each these eight sites for a "fatal flaw" which would expected to result in significant environmen effects greater or equal to those of the propo site. If a "fatal flaw" was identified, the site v eliminated from further consideration in EIR/EIS. As shown in Table 3.3, based



REFERENCE: U.S.G.S. BASE MAP OF CALIFORNIA, SOUTHERN ONE-HALF. DATED 1968 AND REVISED IN 1981.

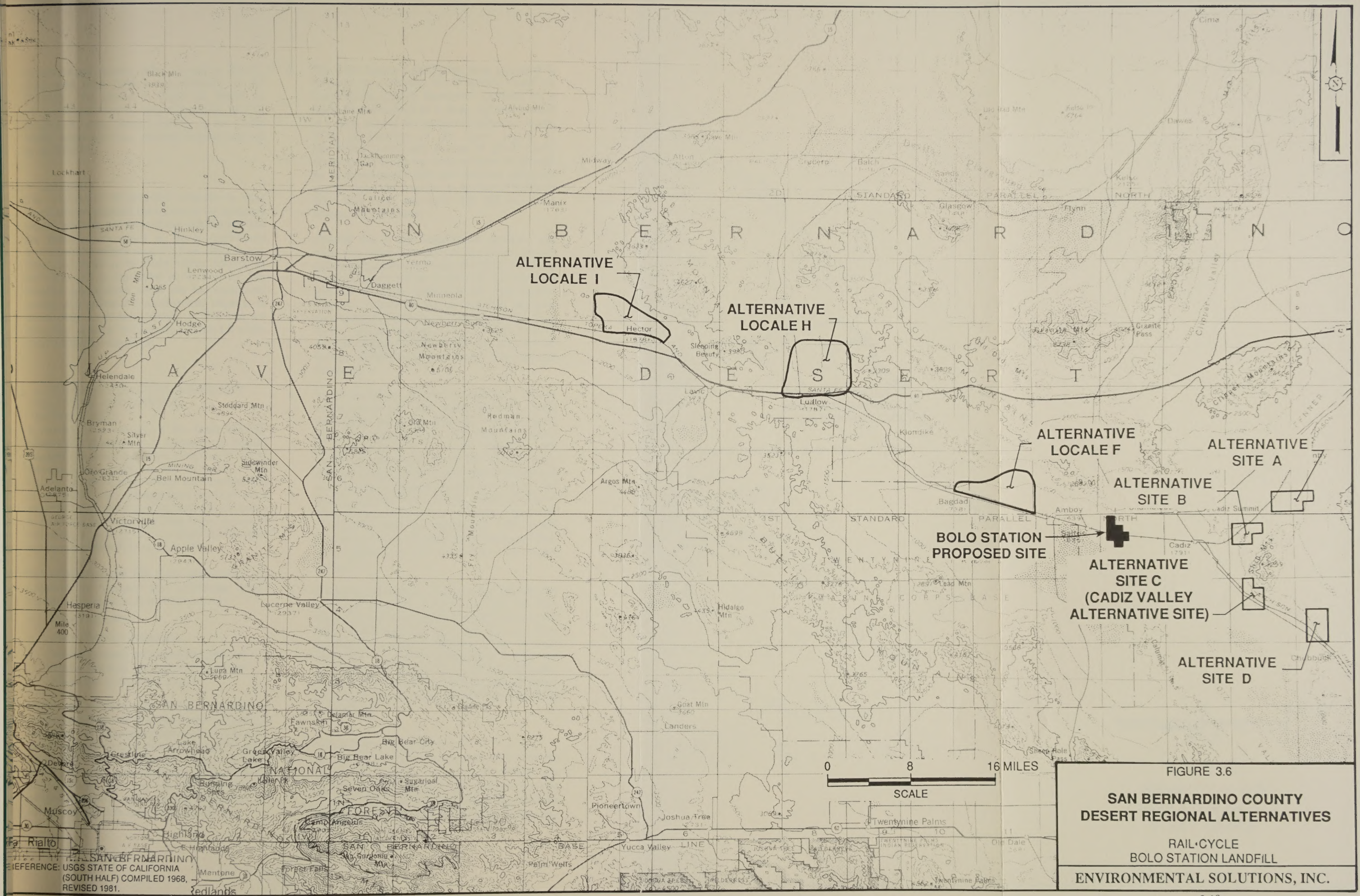
SCAG, 1988.

FIGURE 3.5

SOUTHERN CALIFORNIA DESERT REGIONAL PROJECT ALTERNATIVES

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.



REFERENCE: USGS STATE OF CALIFORNIA (SOUTH HALF) COMPILED 1968, REVISED 1981.

FIGURE 3.6

SAN BERNARDINO COUNTY DESERT REGIONAL ALTERNATIVES

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

environmental factors, only Alternative Site C, eliminated from further consideration in the EIR/EIS. As shown in Table 3.3, based on environmental factors, only Alternative Site C, designated in the Draft EIR/EIS as the Cadiz Valley Alternative site, merited detailed analysis in the EIR/EIS.

.4 Conclusion

The evaluation of potential alternative sites identified one potential alternative to the proposed project site that met basic siting criteria and had the potential to result in fewer significant environmental effects than the Bolo Station site. This site, known as the Cadiz Valley Alternative site (Site C), is described in Section 3.3.1.6; detailed information about the environmental setting and potential environmental impacts of developing a rail-haul landfill at this site are described in detail in Chapters 4.0 and 5.0 of the Draft EIR/EIS, respectively.

ALTERNATIVE WASTE MANAGEMENT PRACTICES AND DISPOSAL TECHNOLOGIES

A number of comments on the Draft EIR/EIS requested information on an alternative to landfill disposal involving increased diversion of waste through source reduction and recycling. The County, and BLM acknowledge that development of alternative waste management practices is an important goal, as the state's population continues to grow and the amount of solid waste generated increases. A commitment to achieving this goal has been established through AB 939.

In implementing AB 939, cities and counties are required to promote the following waste management practices, in order of priority:

- Source reduction.
- Recycling and composting.
- Environmentally safe transformation and environmentally safe land disposal, at the discretion of the city or county.

Cities and counties are further required to maximize the use of feasible source reduction, recycling and composting options to reduce the amount of solid waste that must be disposed of by transformation and land disposal. For wastes that cannot be feasibly reduced at their source, recycled or composted, the city or county may use environmentally safe transformation or environmentally safe land disposal, or both.

4. The Bolo Station Landfill has been proposed in response to a Request for Proposals issued by Los Angeles County Sanitation Districts for a waste-by-rail system to a large regional landfill in a rural area of the southern California desert. With its location in the desert region of San Bernardino County and use of rail-transport, the proposed action has been designed to provide an environmentally safe land disposal option for use by cities and counties in southern California after they have met their AB 939 mandated diversion requirements.

5. Chapter 2.0 of this Supplement confirms that even with implementation of the most stringent existing regulations for waste diversion, additional landfill capacity will be required to meet the daily volume of waste generated by Los Angeles County. Additional use of recycling practices conducted by Rail•Cycle was eliminated from further detailed analysis in the EIR/EIS because the Bolo Station Landfill would only accept waste that has already undergone source reduction and recycling.

6. While alternative disposal technologies, such as environmentally safe transformation, could potentially meet the proposed action's basic objectives of disposing of solid waste that cannot be eliminated due to source reduction and recycling, information about the environmental effects of waste transformation facilities (such as waste to energy facilities proposed by Los Angeles County) indicates that currently feasible alternative technologies would result in similar significant unavoidable environmental impacts. These would include impacts to air quality (both toxic and non-toxic emissions), land use, traffic, and visual resources.

7. Moreover, substantial evidence exists regarding the difficulty in siting waste-to-energy facilities (including public opposition) which indicates that their implementation may not be considered feasible (Los Angeles County, 1992). Because alternative disposal technologies could not eliminate or reduce below a level of significance the environmental effects of the proposed action, they were eliminated from detailed consideration in the EIR/EIS.

3.3.4 NO ACTION ALTERNATIVE

1. As stated previously, consideration of the No Action Alternative is required by CEQA and NEPA. Implementation of this alternative would mean that the Bolo Station Landfill would not be developed. The landfill, off-loading facility and

Fatal Flaw Eval.

TABLE 3.3

SITE-SPECIFIC REVIEW OF POTENTIAL ALTERNATIVE SITES BASED ON ENVIRONMENTAL FACTORS

Note - exact site at Boron never identified.

SITE	ANALYSIS	RECOMMENDATION
Boron	Site contains Category 1 desert tortoise habitat.	Eliminate due to greater potential for des tortoise impacts.
Locale F	Located within nonrecommended Wilderness Study Area (WSA) No. 258 and No. 258A (Lava Hills and South Bristol Mountains). While these two areas are designated as nonrecommended WSAs, the Federal Land Policy Management Act requires BLM to manages nonrecommended WSAs "so as not to impair the suitability of such areas for preservation as wilderness" until Congress acts on wilderness designation. The proposed California Protection Act would fulfill Congress' wilderness designation for the Mojave Desert; however, as of November 1993, Congress has not acted on this act so BLM must continue its management of these nonrecommended WSAs.	Eliminate due to land use conflict.
Locale H	Located largely within proposed California Desert Protection Act wilderness areas No. 250 and No. 256 (Kelso Dunes and Granite/Bristol Mountains).	Eliminate due to land use conflict.
Locale I	Located largely within proposed California Desert Protection Act wilderness area No. 251 (Cadiz Mountain).	Eliminate due to land use conflict.
Site A	Category 1 desert tortoise habitat. A portion of site is on the border of proposed California Desert Protection Act wilderness area No. 299 (Old Woman Mountains).	Eliminate due to greater potential for des tortoise impacts; land use conflict.
Site B	Category 1 desert tortoise habitat. A desert wash cuts through center of site requiring extensive stormwater control, design and construction.	Eliminate due to greater potential for tortoise impacts; hydrologic impacts.
Site C	No obvious environmental flaws. The site is uncategorized for desert tortoise; does not lie within areas proposed for protection under California Desert Protection Act.	Conduct detailed evaluation in EIR/EIS.
Site D	A portion of the site is within proposed California Desert Protection Act wilderness area No. 299 (Old Woman Mountains).	Eliminate due to land use conflict.

91-109 (10/21/93

other site features would not be constructed, and no additional project-related rail traffic associated with waste transport to the Bolo Station Landfill would occur. However, cities and counties in southern California would have access to the existing rail haul landfills in Utah and Arizona for disposal of a portion of their solid waste.

The Bolo Station site would remain in its present state and the proposed land exchange of public lands would not occur. The site would be available for future development, as permitted by the BLM and County.

For a detailed discussion of the environmental effects of the No Action Alternative, see Chapter 5.0 of Draft EIR/EIS and Sections 4.4 and 5.4 of this Supplement.

REDUCED ACTION ALTERNATIVE

The Reduced Action Alternative involves construction and operation of a rail haul landfill on the Bolo Station site, although at a reduced level. The basic changes include the following:

- Inbound solid waste would be reduced from a maximum of 21,000 tons per day to 12,000 tons per day.
- Reduced daily solid waste volumes would result in fewer train trips on a daily basis.
- The landfill life would be reduced from 60 to 100 years to 40 years.
- The landfill footprint and supporting areas would be reduced.
- Subsurface excavation would be reduced, as well as the final landfill height.

Instead of transporting waste from seven MRFs, the Reduced Action Alternative would use four MRFs to transfer 3,000 tons per day each of waste to the landfill. In addition, the landfill life would be limited to 40 years. With these reductions, the capacity of the landfill would be reduced to 230 million cubic yards of waste, a reduction of 487 million cubic yards (or approximately 65 percent) relative to the proposed 717 million cubic yards of the proposed action.

This alternative would also limit the footprint of the landfill and for the project area as a whole. The total project area would be reduced from 4,800 acres to 3,200 acres. The landfill footprint would be reduced from 2,100 acres to approximately 1,780 acres. This alternative would require only four sections of land as opposed to seven and a half for the proposed project. Four of these sections are owned by ATSF and/or Rail•Cycle (Sections 5, 16, 17, and 21), and one is federal land managed by the BLM (Section 15). The western one-half of Section 22 would be eliminated from the landfill footprint, and Sections 8 and 9 would be removed from the project area. A right-of-way for the landfill access road across Section 8 would be required from the BLM. A land exchange would be required only for Section 15 and possibly a right-of-way across Section 8.

4. This alternative would also reduce the amount of subsurface excavation required in support of landfill cell construction, as well as the landfill height. Landfill depth would be reduced by as much as 20 feet. Landfill height would be reduced by 45 feet, but the configuration of the final landfill surface would remain generally the same. The maximum height of the landfill under the Reduced Action Alternative would be approximately 940 feet above msl, rising approximately 285 feet above the existing terrain. The majority of the landfill surface, however, would range from 750 feet to 800 feet msl, or 95 to 140 feet above the existing terrain.

5. Landfill construction and operations would be similar to those described for the proposed action. The phasing plan for the construction of the landfill cells, the liner system, drainage controls, leachate and landfill gas control systems, haul roads and other elements of the landfill design would be consistent with those of the proposed action.

6. The Reduced Action Alternative would require 262 employees for construction (the same as for the proposed action) and 179 for operation (compared to 268 for the proposed action). For a detailed discussion of the environmental effects of the Reduced Action Alternative, see Chapter 5.0 of Draft EIR/EIS.

3.3.6 CADIZ VALLEY ALTERNATIVE SITE

1. The Cadiz Valley Alternative site (referred to in the initial screening as Alternative Site C) is situated approximately ten miles southeast of the proposed site, at the southern toe of the Ship Mountains, as shown in Figure 3.6. The alternative site is a five-square mile area that is roughly bisected (from northwest to southeast) by Cadiz Road and the Arizona-California Railroad.

2. The alternative site is located in Township 4 North, Range 15 East, Sections 5, 8, 9, 16 and 17. Sections 5 and 9 (1,280 acres) are owned by Santa Fe Pacific Properties, Inc. Section 8 (640 acres) is federal land managed by the BLM as

multiple-use class M. Section 16 (640 acres) is state land, and Section 17 (640 acres) is owned by Cadiz Land Company.

3. One section of BLM land (Section 8) within the Cadiz Valley Alternative site would be exchanged with Rail•Cycle for land of equal or greater value. Two exchange sections are considered for the Cadiz Valley Alternative site, as opposed to three for the proposed action, due to the smaller amount of BLM land involved (one section instead of two and a half for the Bolo Station site). The exchange sections considered are the same as those proposed for the Bolo Station site, with the exception of the Cadiz Dunes area. This section was eliminated from consideration for exchange because it is the closest to the Cadiz Valley Alternative site. Implementation of this alternative would require that Section 17 be purchased from the Cadiz Land Company.

4. Similar to the Bolo Station site, the Cadiz Valley Alternative site is situated within the creosote bush scrub biotic community in a sparsely populated rural setting. The town of Cadiz lies six miles northwest of the site, and Route 66 is an additional three miles to the northwest. Archer Station lies one and one-half miles southeast of the site boundary.

5. Onsite elevations range from approximately 650 to 1,000 feet above msl. Bedrock outcrops occur in Sections 5 and 9, which are nearest to the Ship Mountains. Although a portion of the site was previously within an area designated by the BLM as nonrecommended preliminary wilderness area, the site is not proposed for designation as a wilderness area or any other form of protection under the proposed California Desert Protection Act. For more detailed information about the site's environmental setting, see Chapter 4.0 of the Draft EIR/EIS.

6. The landfill design, construction and operation at the Cadiz Valley Alternative site would be similar to the proposed action. At this site, the landfill would be located on the southwest side of the rail line. As the landfill would be located on a portion of three sections of land, the landfill would reach a height of approximately 800 feet above the existing terrain to allow for the diposal of the same amount of waste as the proposed Bolo Station site.

7. Municipal solid waste would be transported daily to the alternative site via rail from MRFs situated in the City of Commerce and up to six other locations throughout southern California. Recyclables would have been removed from the waste stream prior to transport to the landfill. Once at the landfill, waste would be off loaded from trains and transported to the working face of the landfill, where it would be disposed. Leachate and landfill gas would be monitored and, if any were generated, would be collected or treated as necessary. Ground water quality would also be monitored. This alternative would observe all federal, state and local requirements for solid waste landfills, including closure and postclosure procedures.

8. For more detailed information about the environmental effects of developing the proposed action at the Cadiz Valley Alternative site, see Chapter 5.0 of the Draft EIR/EIS.

CHAPTER 4.0
AFFECTED ENVIRONMENT

4.0 AFFECTED ENVIRONMENT

This chapter provides descriptions of the existing environment related to issues for which revised or clarified information is available since distribution of the Draft EIR/EIS. The areas addressed in this chapter are as follows:

- Geology and Soils
- Surface Hydrology and Ground Water
- Mineral Resources
- Air Quality
- Noise

4.1 GEOLOGY AND SOILS

4.1.1 SOILS AND STRATIGRAPHY

At the request of the RWQCB, geologic field mapping of the southeast portion of the Bristol Mountains, located about 1,600 feet north-northwest of the proposed site, was performed. An outlier of this mountain range, informally referred to as the Bolo Outlier, is located in the northern portion of the site (see Figure 4.2.2 of the Draft EIR/EIS). Based on the field study, a more detailed geologic map was prepared to depict the geologic units of the southeast portion of the Bristol Mountains (Jacobs, 1992d). The Bolo Outlier area within the northern portion of the proposed site was also mapped to provide a coherent bedrock geology of the entire study area. Based on this mapping, it has been determined that this portion of the Bristol Mountains are underlain by limestone, dolomite, metasedimentary rocks, granitic rocks, and alluvial fan deposits.

A 500-foot deep boring hole was drilled in the southwestern portion of site in the vicinity of Monitoring Well (MW)-7 and Piezometer (P)-14 (see Figure 4.1.1), at the request of the BLM to better assess the mineral deposits beneath the project area. Discrete soil sampling was conducted between depths of 200 and 500 feet below ground surface. Samples were not collected in the upper 200 feet of the borehole since representative soil samples to this depth had been collected in previous studies. The encountered deposits were categorized into the following three distinct depositional zones (Rust, 1993c):

- Distal Alluvial Fan Deposits (0 to 275 feet): Sediments consisted primarily of sands, silty sands, and clayey sands with intermittent intervals of silty clays. The increased sand content within these sediments is indicative of distal alluvial fan deposits. These deposits appear to constitute a single water bearing zone, the lower extent of which is approximately 290 feet below the ground surface at the southern boundary of the proposed landfill site.
- Marginal Playa Deposits (275 to 390 feet): These deposits were characterized by an increase in finer-grained materials with a corresponding decrease in sand fraction. The subsurface sediments predominantly consisted of clayey silts/silty clays and sandy clays. Moisture content within these materials generally decreased with depth which corresponded with a higher degree of compaction and increased percentage of finer materials. A water-bearing sand zone, approximately 5 feet thick, was encountered at a depth of approximately 339 feet below ground surface. Several thin intermittent horizons of evaporite mineralization were encountered with increased depth consisting primarily of calcite, gypsum/gypsite, and very minor amounts of halite.
- Lakebed Deposits (390 to 500 feet) Lakebed deposits (saline mudflat deposits) below 390 feet were characterized by increasing clay content with corresponding decreases in sand and silt fraction. Alternating layers of clay, cemented sands, and evaporite mineralization were observed. Moisture content within the clay materials was generally minimal; apparently limited due to the effects of compaction, degree of stiffness, and percentage of finer-grained materials.

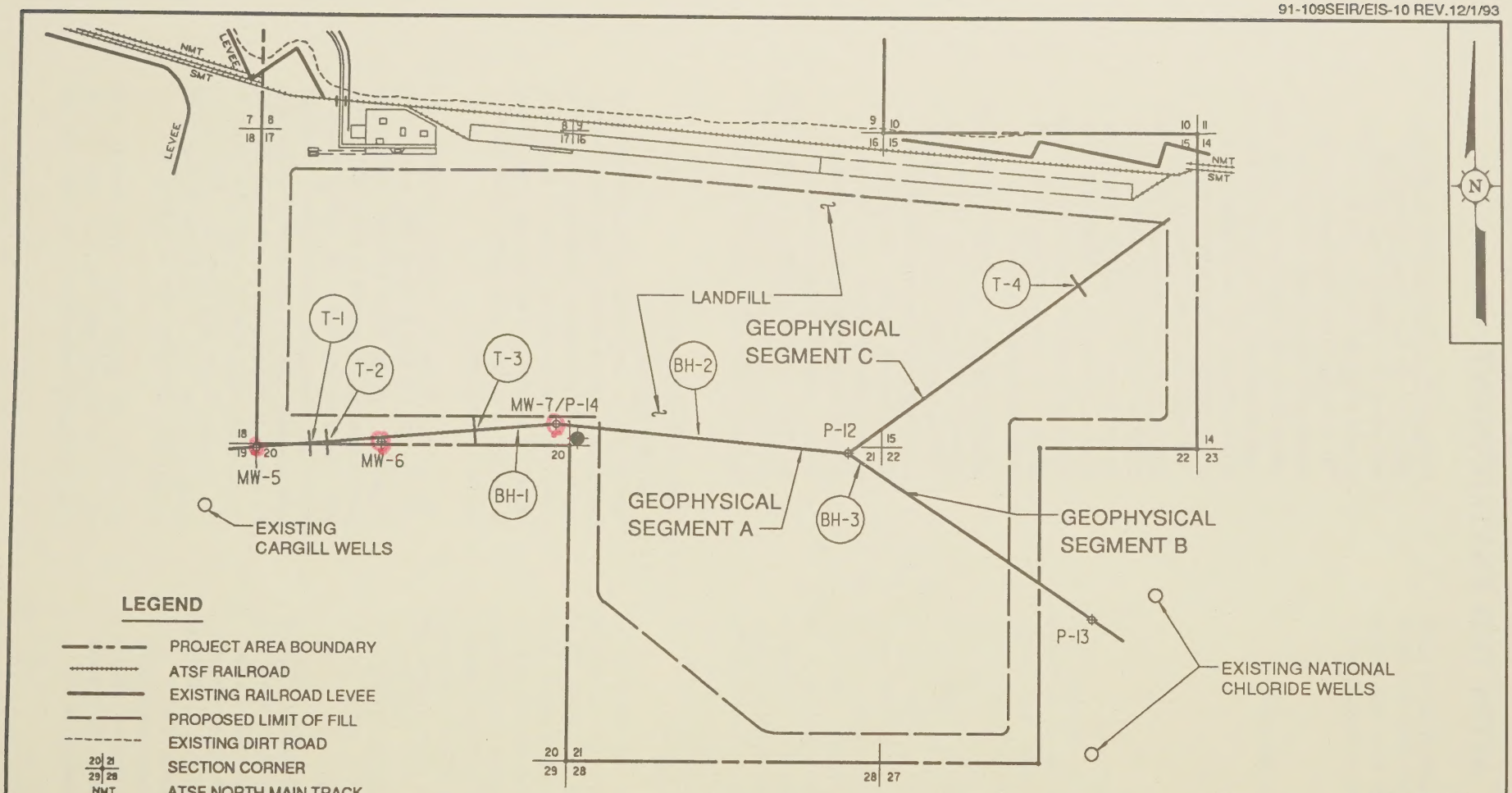
4.1.2 STRUCTURE/FAULTS

4.1.2.1 Faulting and Seismicity

1. Tectonically, the Mojave Desert is characterized by a series of northwest trending, right lateral, strike-slip faults. These faults are primarily concentrated in the central to southwest portion of the Mojave Desert and become more diffuse and poorly defined in the eastern portions of the desert where the Bolo Station site is located.

2. The updated California Division of Mines and Geology (DMG) fault location map, as shown in Figure 5.2.1 of the Draft EIR/EIS, reflects the most current data in regards to active faults. This map includes the June 28, 1992, Landers earthquake (magenta color faults), centered approximately 50 miles west of the proposed site. As shown in Figure 5.2.1 of the Draft EIR/EIS, there are no active faults (orange color faults) in the vicinity of the proposed site. The nearest mapped active fault is the Pisgah-Bullion fault located about 29 miles southwest of the site.

3. Based on the geomorphic and seismic data evaluated during the Phase I and II site characterization studies there is no evidence of site



LEGEND

- PROJECT AREA BOUNDARY
- ATSF RAILROAD
- EXISTING RAILROAD LEVEE
- PROPOSED LIMIT OF FILL
- EXISTING DIRT ROAD
- SECTION CORNER
- NMT — ATSF NORTH MAIN TRACK
- SMT — ATSF SOUTH MAIN TRACK
- MW-6 — EXISTING MONITORING WELLS
- P-13 — EXISTING PIEZOMETER
- BH-1 — BORINGS TO EVALUATE GEOPHYSICAL ANOMALIES
- T-1 — TRENCHES TO EVALUATE GEOPHYSICAL ANOMALIES
- 500 FOOT DEEP BORING TO EVALUATE MINERAL DEPOSITS

REFERENCE: JACOBS ENGINEERING GROUP, 1992

FIGURE 4.1.1

GEOPHYSICAL SURVEY LOCATIONS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

faulting, active or otherwise (Jacobs, 1990; 1991). The review of aerial photographs of the proposed site indicate that there is no surficial evidence of faults in either the landfill portions of the site or within the old alluvial fans with well developed desert pavement north of the site. Based on the seismic refraction and reflection data, both the deep bedrock reflector and the near surface water table were continuous and unbroken beneath the proposed site.

There are three inactive faults located within 6 to 24 miles of the site (Broadwell Lake, Bristol Mountains, and Ludlow faults, respectively) that were considered for purposes of landfill engineering and design by Rail•Cycle (Jacobs, 1991). Although not classified as active by the DMG, the Broadwell Lake and Ludlow faults were considered by Rail•Cycle in its design as active to provide a conservative assumption for seismicity analyses.

The Bristol Mountains Fault, located about 14 miles northwest of the center of the proposed site is a poorly defined and discontinuous fault. It is classified by DMG as inactive (i.e., no evidence of movement in the last 1.6 million years).

Although the studies conducted prior to distribution of the Draft EIR/EIS indicated that no active or potentially active faults were known to be within or trending toward the Bolo Station site, as noted in the Draft EIR/EIS, a north-south trending surface feature or lineament was observed on aerial photographs and during a site reconnaissance visit. The lineament was located on the western edge of Section 29, south of the Cargill Salt brine pumping wells (Jacobs, 1990). The photo trace did not extend onto the proposed site. Based on subsequent investigations discussed in the following section, it was concluded that this lineament is most likely a shoreline feature and not related to faulting.

In summary, the follow-up investigations verify the findings and conclusions of the Draft EIR/EIS that there are no active or inactive faults within the vicinity of the proposed site or that tend towards the site. The following section describes the follow-up investigations conducted to verify these findings.

4.1.2.2 Geologic Mapping

As noted above, follow-up geologic field mapping of the southeast portion of the Bristol Mountain was conducted in 1992 (Jacobs, 1992b). The purpose of the study was to map the geologic units that make up the Bristol Mountains to determine if Holocene faults are present which could impact the proposed landfill. DMG classifies faults as "active" if they have had a surface displacement during Holocene time (within the last 10,000 years as defined by DMG).

2. Based on field mapping and analysis of available data, no Quaternary faults (faults showing displacement within the last 1.6 million years as defined by DMG) or younger faults were found in the survey areas. One northeast trending fault was identified through the field survey near the western limits of the Bristol Mountain area. It does not project towards the Rail•Cycle site and no evidence of recent fault activity was observed during field mapping (e.g., no clayey gouge, sheared soil or bedrock units). This fault could not be traced into adjacent late Quaternary alluvial fans. It was interpreted to be a pre-Quaternary bedrock fault (more than 1.6 million years ago) that is not relevant in terms of the later Quaternary tectonic framework of the area (Jacobs, 1992b).

4.1.2.3 Geophysical Surveys and Trenching

1. Based on discussions and meetings with representatives of the RWQCB, geophysical surveys were performed to verify the absence of Holocene faults and to confirm the absence of buried, gravel channel deposits (Jacobs, 1992b). The geophysical survey procedures performed in May 1992, included shallow and deep electromagnetic surveys, very low frequency, resistivity, ground penetrating radar, and seismic refraction and reflection (Jacobs, 1992b). The primary data used to evaluate faulting were seismic refraction and reflection in combination with ground penetrating radar. The survey results were verified through a trenching program at selected locations.

4.1.2.3.1 Survey Alignment

1. The geophysical survey alignments are shown in Figure 4.1.1. The alignment consisted of three segments designated as A, B, and C. The orientation of the segments was designed to capture the regional northwest-southeast trend of faults that may project towards or through the proposed site. Table 4.1.1 summarizes the geophysical survey techniques performed for each alignment.

4.1.2.3.2 Survey Results

1. Seismic reflection data were used to check for deep (150 to 1,000 feet) discontinuities in the bedrock surface and seismic refraction data were used

TABLE 4.1.1

GEOPHYSICAL SURVEY TECHNIQUES[1]
MAY 1992

TECHNIQUE	SURVEY SEGMENT	APPROXIMATE DEPTH EVALUATED (feet)	FEATURES TO BE EVALUATED
Ground Penetrating Radar	A, B, C	5 to 8	Holocene Faults
Shallow Electromagnetics (EM31)	A, B, C	12 to 15	Holocene Faults
Deep Electromagnetics (EM34)	A, B	25 to 100	Buried Gravel Channels
Very Low Frequency Resistivity	A, B	35 to 100	Buried Gravel Channels
Seismic Refraction	A, B	0 to 300	Faults
Seismic Reflection	A, B	150 to 1,000	Faults

91-109 (12/2/93/mg

(1) Seismic data collection was not designed to resolve near surface faulting (Jacobs, 1993a).

Source: Jacobs, 1993a.

to check for nearer surface (50 to 300 feet) discontinuities. Shallow discontinuities (0 to 8 feet) were examined with ground penetrating radar. The data were then cross-correlated.

Four anomalies were identified in the ground penetrating radar data which generally corresponded to anomalies in the seismic survey and/or electromagnetic data. Shallow electromagnetic data was evaluated for conductivity contrasts due to variations in ground water or sediment type which could have been caused by a fault.

Three of the anomalies identified in the electromagnetic data appeared to be related to near surface buried channels rather than faults because their amplitude decreased with depth and also because they were detected by the shallowest electromagnetic method. Field reconnaissance revealed that surface channel features were associated with two of the three anomalies. Based on the geophysical survey and reconnaissance, it was concluded that the third anomaly probably represented a near surface buried channel that lacks surficial expression. Subsequent drilling verified that this anomaly was associated with fine to coarse sand deposits located above the water table (see Section 4.1.2.4.5). Based on the review of shallow electromagnetic data, there were no anomalies that suggested the presence of Holocene faults.

Seismic refraction and reflection survey data were collected simultaneously. The fourth anomaly was identified based on a significant refractor beneath the proposed site which corresponded closely with the ground water table measured from the existing wells. No additional refractors were recognized within the depths of the survey. The ground water table shown on the refraction record was relatively smooth, continuous, and unbroken, suggesting that the fourth anomaly does not represent a Holocene fault present beneath the survey line.

The seismic reflection data revealed a strong basement bedrock reflector located at depth, rising relatively uniformly from about a 1,000-foot depth on the west to about a 600-foot depth on the east. The seismic reflection data indicates a depth to bedrock substantially less than that estimated in previous gravity studies (e.g., Biehler, 1991 and Jacobs, 1991). Seismic reflection data is considered by geophysicists as being more accurate than gravity analysis. The continuity of bedrock supported by the seismic reflection data and previous gravity studies along with the continuous, unbroken water table supports the conclusion regarding the absence of major fault movement beneath the site.

4.1.2.3.3 Trenching Methodology

1. Although review of the shallow ground penetrating radar and the electromagnetic data from the geophysical survey did not reveal evidence to suggest the presence of Holocene faults, the four anomalies discussed above were selected for further field verification evaluation. The field program to verify the absence of Holocene faults consisted of the excavation of four trenches approximately 10 feet in depth and ranging from 60 to 90 feet in length. The 10-foot depth was determined to be sufficient to penetrate Holocene soils (i.e., those soils deposited within approximately the last 10,000 years) at the proposed site. The ground penetrating radar identified anomalies were used to place the location of the trenches which were extended 10 to 20 feet past either side of the defined anomalies to account for variability in data resolution and survey alignment and control methods. The locations of the trenches are shown in Figure 4.1.1.

4.1.2.3.4 Trenching Results

1. As shown in Figure 4.1.1, Trenches 1, 2, and 3 were excavated along the southern portion of the proposed site within distal alluvial fan deposits. Trench 4 was excavated near the northeast portion of the site within an active alluvial channel. Based on visual inspections during the trenching, the near surface earth materials consists of alluvial fan deposits and playa/lacustrine deposits with moderately well developed soil profiles. No shear, offset beds, or other evidence of faulting were observed in these trenches.

2. The completed trenching logs were compared to the anomalies identified by the ground penetrating radar data. The anomalies evaluated by trenching are typical of alluvial channel features that are nontectonic in origin. The edges of a number of alluvial channel deposits have sharply incised preexisting deposits which yield a very sharp, high-angle reflection in the ground penetrating radar.

3. The potential continuity of the north-south trending lineament located about one mile south of the site (as discussed in the Draft EIR/EIS) was further evaluated by geophysical surveys, field reconnaissance, trenching, and by reviewing

stereo-paired aerial photographs (Jacobs, 1993a). Based on field observations, this feature (identified in the text of the Draft EIR/EIS as Lineament A) was represented by a linear north-south ridge elevated about 1 to 2 feet on the east side. In the aerial photographs, there are a series of more subdued north-south trending linear features in the vicinity of Lineament A. These features are located below the old Bristol Lake shoreline (approximate elevation 620 feet) and are denoted as tonal contrasts, that based on field reconnaissance, are related to alternating fine-grained and coarser-grained beds. Given the concentration of these features in one area, and the lack of their continuity above the old Bristol Lake shoreline, their most likely origin is a lakeside feature, such as a recessional shoreline or bar feature, and is not fault related.

4. Based upon the December 1992 seismic refraction and reflection surveys performed across the site, the relatively shallow ground water table is continuous and unbroken. Based on the seismic reflection data, a continuous, unbroken deep, bedrock reflector was also mapped across the site. These findings support the lack of continuity of Lineament A beneath the site. This conclusion is further supported by the presence of continuous, unbroken later Pleistocene beds (between 10,000 and 1.6 million years old) within Trenches 1 and 2 which were located near the northward projection of Lineament A.

5. In summary, the absence of Holocene faulting beneath the proposed site was verified by the 1992 geophysical survey. The information supports the geomorphic and seismic data for the proposed site, and the findings and conclusions of the Draft EIR/EIS. Based on the data, there are no active faults within or in the vicinity of the Bolo Station site.

6. Holocene faulting, therefore, has been evaluated at the site in accordance with the CCR Title 23 siting criteria for Class II or III landfills and, if approved, the proposed landfill could be developed without seismic structural setback requirements.

4.1.2.4 Buried Gravel Channel Investigation

1. Although previous site characterization studies did not find evidence of the presence of buried gravel channels beneath the proposed site (Jacobs, 1991), additional work was requested by the RWQCB to further evaluate the potential for these channels. Buried gravel channels beneath the water table are of concern because they could act as preferential ground water migration pathways.

An investigation of potential buried channels w conducted using ground penetrating radar and v low frequency resistivity surveys followed borings at selected locations.

4.1.2.4.1 Depositional Environment

1. The site geology is dominated by the presence o large alluvial fan that emanates from the Bris Mountains to the north. The alluvial fan composed of alternating sequences of sand, sil and gravel. The coarser layers (gravel beds) generally concentrated near the mountain fro and finer-grained units (silts, clays, and si sands) are concentrated near the distal portions the fan where the proposed landfill footprint located. Channel flows which dissect the alluv fan surface primarily give way to sheet flow run on the more distal portions of the fan. T channels do not commonly remain in one locati for significant periods of time; therefore, t deposition of vertically and laterally continuo gravel channels is not likely, especially in t distal portions of the alluvial fan.

4.1.2.4.2 Survey Alignment

1. Shallow and deep electromagnetic, and very lo frequency resistivity surveys were designed evaluate the presence of buried gravel channe The locations of Segments A and B, as shown Figure 4.1.1, were chosen in the southern porti of the site for electromagnetic surveys determine the contrast between sediment ty (fine-grained vs. coarse-grained channel deposit and ground water type. Thick, continuous grav channel deposits would likely yield low conductivity values than adjacent soils. Grou water preferentially migrating from the north (lo regional ground water conductivity) to the sou (high regional ground water conductivity) wou add to this conductivity contrast which may b detected by the electromagnetic and very lo frequency resistivity surveys.

2. Segment C, was only used to evaluate th presence of Holocene faults and was not used study the potential for buried channel Table 4.1.1 summarizes the geophysical surve techniques used for the analyses.

4.1.2.4.3 Survey Results

1. As discussed in Section 4.1.2.3.2, three electr magnetic and very low frequency resistivit anomalies were located. These anomalies we observed on the shallow and deep electromagneti surveys and corresponded with very low frequenc resistivity data. The amplitude of these thre

anomalies decreased with depth, suggesting that they represent relatively shallow features. The features were believed to be near-surface buried sand or gravel channels or shallow (i.e., above ground water) surface channels of relatively large scale. Gravel channel deposits situated above the ground water table are not considered a concern as they would not provide a ground water migration pathway.

Field reconnaissance verified that surface channel features were associated with two of the three anomalies. There was, however, no evidence of a surface channel or other corresponding geologic feature at the third anomaly. Based on the geophysical survey data, it appeared that the third anomaly was a near-surface buried sand or gravel channel. The subsequent drilling exploration conducted at this anomaly verified that it was not associated with a buried gravel channel. (Jacobs, 1992c; see Section 4.1.2.4.5).

.2.4.4 Drilling Methodology

Anomalies detected in data from the electromagnetic and very low frequency resistivity surveys were used to identify locations for borings. Three borings, located as shown in Figure 4.1.1, were advanced to a depth of about 80 feet and logged continuously. Each boring was drilled approximately 20 feet past the ground water table. Soil samples were collected at 5-foot intervals and submitted to a geotechnical laboratory for determination of moisture content and density. Water samples were also collected from each boring at the time of drilling. Down-hole geophysical surveys (i.e., neutron-neutron and gamma) were also performed at each boring.

.2.4.5 Drilling Results

The borings logs reflect primarily sand, silty sand, and clayey sand with thinner sequences of fine-grained beds (silts and clays). Thick continuous gravel beds were not encountered either above or below the ground water table (Jacobs, 1992b).

The soils logged in the borings were plotted adjacent to the downhole geophysical logs for comparison. Both neutron-neutron and gamma logs were performed. The geophysical signal response provided a relatively good correlation between lithologies and the downhole logs. If thick gravel beds were present, they would produce a significant signal response height on gamma and neutron-neutron logs. No such response was detected, and therefore, there was no evidence of thick buried gravel channels at the boring locations.

3. Water sample analyses were conducted to determine if preferential transportation pathways exist. If gravel channels were present, the general mineral concentrations of the ground water may be substantially reduced from that of surrounding less permeable formations due to flow through the gravel from the fresh water regime northeast of the site. No suggestion of fresh water pathways were observed in the analytical results. This was supported by the fact that thick channel deposits were not encountered in the drilling, either above or below the ground water table.

4. In summary, the most likely locations of buried gravel channels (based on potential anomalies defined by the electromagnetic and very low frequency resistivity surveys) were evaluated by drilling and data analyses and no buried gravel channels were identified. The anomalies were found to be associated with fine to coarse sand deposits generally located above the ground water table. Since the most likely sources for buried gravel channels beneath the water table were evaluated and found not to exist, additional evaluation is not warranted.

4.1.3 SOIL CONSOLIDATION/GROUND SETTLEMENT

1. The degree of consolidation of subsurface soils is important in estimating the settlement potential of the soils beneath the proposed site. Consolidation is the adjustment in the volume of a saturated soil in response to an increased load (i.e., weight). Consolidation involves the squeezing of water from the pore space of the soil and resulting decrease in the void space ratio of the soil. Less settlement would occur due to applied loads in soils which have already been consolidated.

2. Another important factor in the amount of consolidation that will occur is the cohesive versus cohesionless nature of the soil. Cohesive soils (i.e., clays and silts) are more prone to consolidation. Therefore, the more cohesive the soil, the more settlement that could occur as a result of consolidation. Cohesionless soils (i.e., sands and gravel) are less prone to consolidate and, therefore, less settlement occurs in these types of soils.

3. The depositional model of playa basins, such as the Bristol Basin, is sufficiently known that reasonable assumptions regarding settlement and consolidation can be made. The depositional environment under which the Bristol Basin was formed is consistent with the observed over-

consolidation of its sediments. The geologic history of the Bristol Basin is characterized by repeated cycles of flooding, sedimentation and drying, which results in continuous consolidation of underlying soil layers (Rosen, 1991). Rosen examined a wide range of geologic, geochemical and paleontological data and concluded that the Bristol Basin was formed by a shallow lake, and that the majority of the sediments were deposited in shallow (i.e., less than 10 meters) deep, perennial or ephemeral water bodies. These sediments were subjected to repeated exposure as the water bodies dried up.

4. Based on the 1991 sampling information, soils beneath the site were classified as "normally consolidated" to "slightly over-consolidated." The variation in the degree of consolidated soils at the site is relatively consistent with soils classified as "slightly over-consolidated" on the northern portion of the proposed landfill footprint where cohesionless soils (i.e., sand and gravel) occur, to "normally consolidated" on the southern boundary of the landfill footprint where cohesive soils (i.e., clay and silts) predominate (Jacobs, 1991).

5. Additional field work, including soil sampling and laboratory analysis, was conducted in September 1992 to support more detailed construction level engineering and design (Jacobs, 1993b). Based on the more recent 1992 soil tests, it was determined that portions of the soils underlying the site could be classified as "over-consolidated" rather than "normally consolidated" (Jacbos, 1993b). However, to assure a conservative design criteria, Rail•Cycle plans on using the classification of "normally consolidated" to "slightly consolidated" which will account for the largest amount of anticipated soil consolidation and settlement.

6. In April 1993, a 500-foot boring was drilled by Rail•Cycle in the southwest corner of Section 16. Soil samples from this boring were analyzed to determine their consolidation properties. The results of this analysis confirms the previous analysis conducted by Jacobs regarding the over-consolidated nature of the soils beneath the site (Rust, 1993e).

7. Based on the soil parameters as defined by the subsequent soils sampling and analysis, settlement anticipated due to the additional load of the landfill, and due to ground water pumping, would be expected to be less than previously estimated for normally consolidated soils. However, as described in Section 5.1 of th Supplement, for conservative design purpos maximum settlement was based on the previous derived soil parameters for normally consolidat soils.

8. Revised and/or clarified impact analysis a mitigation measures regarding soils and geolo are detailed in Section 5.1 of this Supplement.

SURFACE HYDROLOGY AND GROUND WATER

.1 SURFACE WATER

Hydrologic analysis of the proposed site was based on procedures similar to those of the San Bernardino County Hydrology Manual. Eight different drainage areas with a combined drainage area of 10.6 square miles were defined and analyzed. The 100-year floodplain as mapped essentially follows the 620-foot contour, and potentially encompasses a small portion of the extreme southwestern corner of the project site (see Figure 3.1).

.2 GROUND WATER

.2.1 Ground Water Quantity and Flow

.2.1.1 Estimated Annual Ground Water Recharge

Ground water recharge in the project area is not well-established. As noted in the Draft EIR/EIS, the annual safe yield of ground water which can be withdrawn from the Bristol and Cadiz Basins has not been quantified by the California Department of Water Resources (DWR) since 1975.

Subsequent to distribution of the Draft EIR/EIS, additional ground water recharge estimates for the basins have been prepared. In the Draft EIR (SCH No. 89020203) for Cadiz Land Company's (CLC's) proposed agriculture use expansion (from 1,440 acres to 9,600 acres), an evaluation of the potential impacts of ground water withdrawal on the Bristol and Cadiz basins was included (URS, 1993). This analysis provides supplemental information from which to compare the evaluation in the Bolo Station Draft EIR/EIS, and also provides data reviewed in light of potential cumulative project impacts on the ground water basin. The lower bound of ground water recharge used for the CLC project Draft EIR of 3,500 acre feet per year was based on the 1975 DWR estimates. The upper bound of 20,000 acre-feet per year recharge was based on the CLC's estimates of ground water recharge (Pacific Agricultural Holdings, 1991).

A ground water drawdown analysis was conducted for the Draft EIR for the CLC project based on the estimated annual use of 30,000 acre-feet per year for the expanded agricultural use (at full development to occur within 15 to 20 years). Even at the high 20,000 acre-feet per recharge estimate, a net of 10,000 acre-feet per year would be drawn from the basin for the agricultural use, resulting in a net 250,000 acre-feet reduction in ground water in the basin after 40 years of operation (URS, 1993). Under this scenario (20,000 acre-feet recharge level), the maximum drawdown beneath the CLC agricultural site was projected to be 80 feet. Beyond the CLC site boundary, a 20-foot drawdown contour would extend for a radius of four to five miles. The 10-foot drawdown contour would extend into the proposed Bolo Station Landfill site.

4. Under the worst-case scenario, (3,500 acre-feet per year annual recharge of the ground water basin) the maximum drawdown at the CLC site was projected to be 200 feet. The 100-foot drawdown contour would extend for a radius of about three miles, and the 50-foot contour would extend for a radius of about four to five miles. The Bolo Station Landfill site would fall between the 10- and 50-foot drawdown contours.

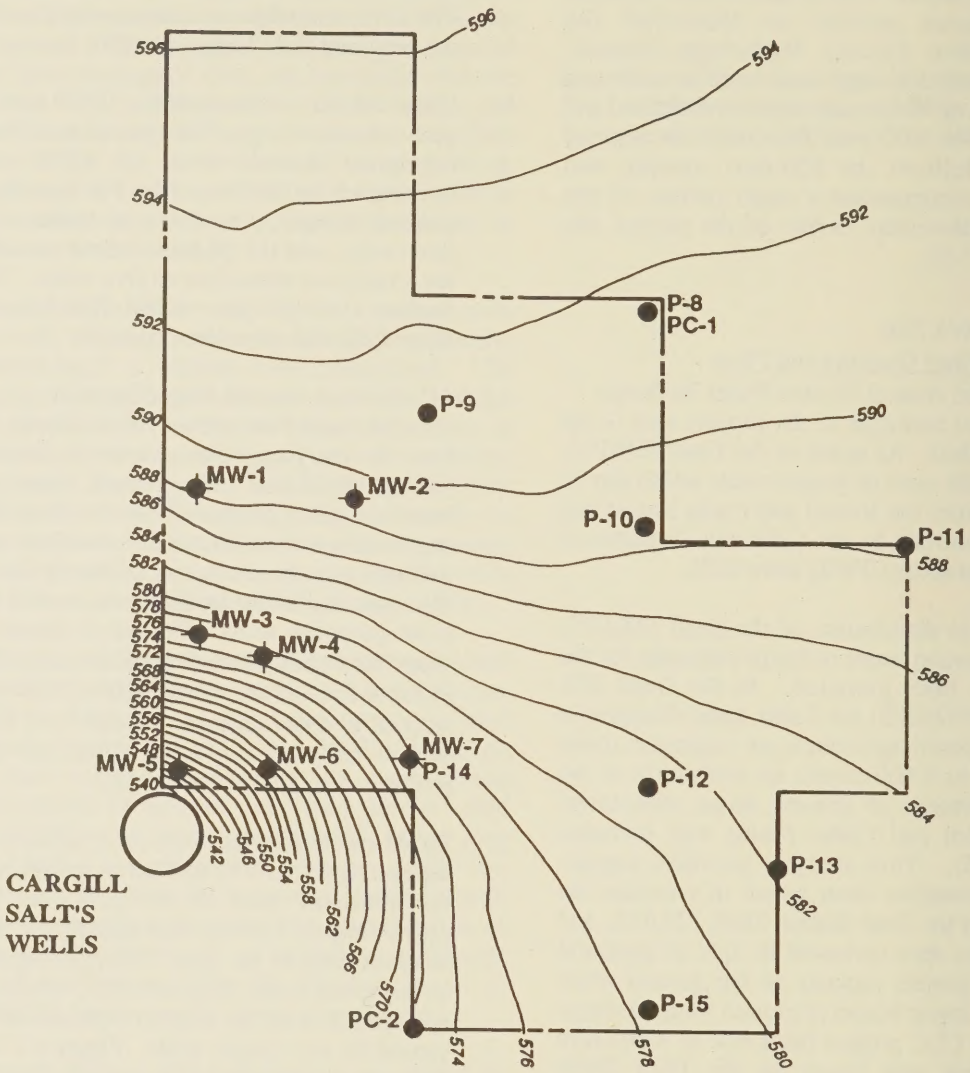
4.2.2.1.2 Existing Ground Water Contours

1. Ground water flow within Bristol Basin is radial from the outlying recharge areas to the center of Bristol Dry Lake. The ground water gradient beneath the proposed Bolo Station site is generally toward the south beneath the northern half and then turns to a southwesterly direction in the south half of the landfill area, toward Cargill's brine pumping wells. Estimated natural ground water flow gradients are approximately 7.5×10^{-4} (4 feet/mile) in the north half of the site, and steepen to approximately 8.7×10^{-3} (46 feet/mile) within about a one-mile radius of Cargill's production wells (Jacobs, 1991).

2. Based on monitoring well data, depth to ground water ranges from 195 feet below ground surface at the northern part of the proposed site, to approximately 37 feet below ground surface at the southern part of the site. The existing contours, as discussed in the Draft EIR/EIS, reflect the cone of depression in the southern portion of the site caused by the Cargill wells. Figure 4.2.1 depicts the measured ground water contours based on data collected in April 1991, while Cargill's wells were in operation (Jacobs, 1991).

4.2.2.2 Ground Water Quality

1. Brackish ground water beneath the proposed site occurs between the relatively fresh water of the basin margins and the brine solutions underlying the dry lake. In general, wells farther from Bristol Dry Lake yield water of relatively higher quality in terms of potability. The Draft EIR/EIS characterized approximately 60 percent of the ground water underlying the site as brackish and nonpotable. The delineation was based on a definition of brackish water as having total dissolved solids (TDS) values exceeding



LEGEND

- MW-1 GROUND WATER MONITORING WELL
- PC-1 PIEZOMETER CLUSTER
- P-8 PIEZOMETER
- 580 GROUND WATER ELEVATION IN FEET

NOTE:
CONTOURS DEVELOPED BASED ON DATA COLLECTED DURING APRIL 1991 WHILE LESLIE SALT'S (CARGILL) BRINE WELLS WERE PUMPING.

SOURCE: JACOBS, 1991b.

0 4,000 8,000 FEET
SCALE

FIGURE 4.2.1

MEASURED GROUND WATER CONTOURS (APRIL 1991)

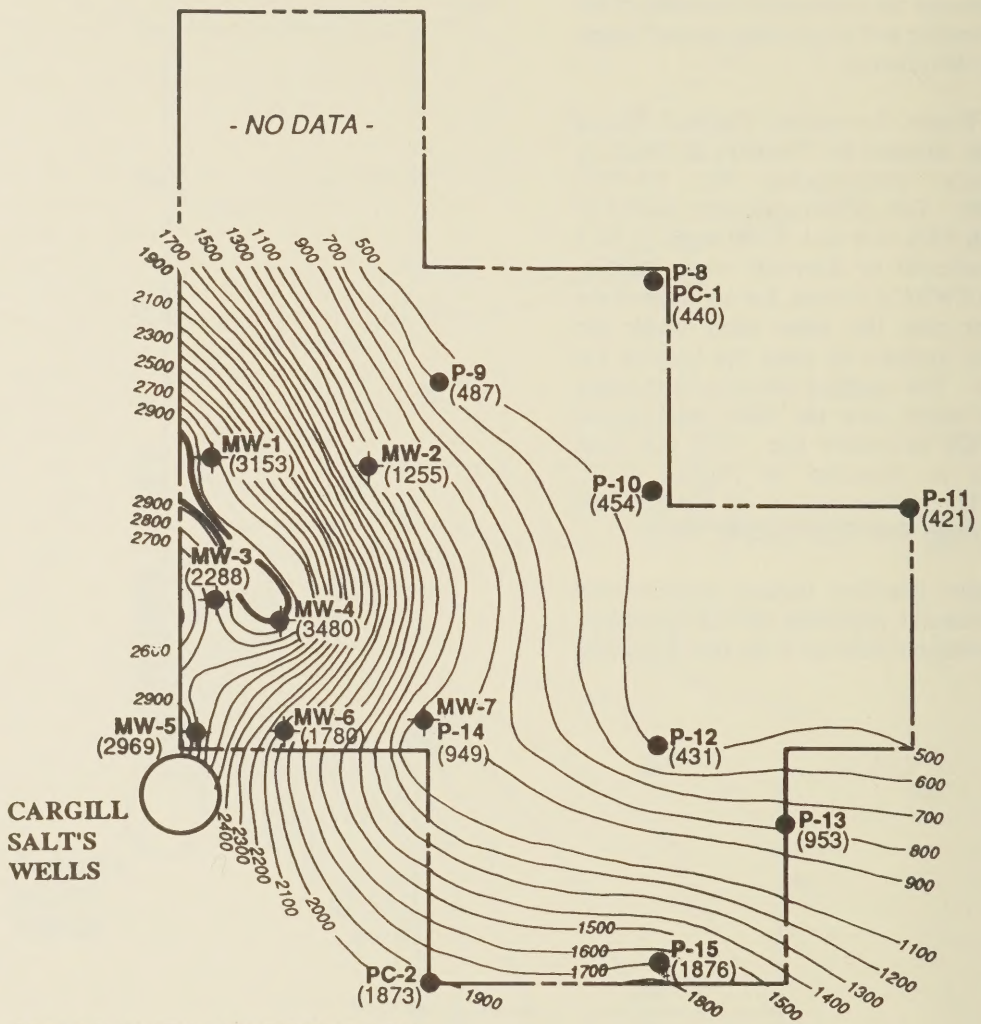
RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

1,000 milligrams per liter (mg/L), but less than the TDS values reported in brine solutions underlying the playa (greater than or equal to 35,000 mg/L TDS). Figure 4.4.11 of the Draft EIR/EIS delineated the approximate location of the interface of potable and nonpotable ground water, as defined by this criteria.

The State Water Resources Control Board (SWRCB) has adopted the "Sources of Drinking Water Policy" (Resolution No. 88-063, May 19, 1988). This policy considers waters of the State with TDS less than 3,000 mg/L to be a potential municipal or domestic water supply. Based on the SWRCB criteria, the majority of the ground water near the water table under the proposed site appears to meet the criteria for potable water. The interface between fresh water and brackish water (near the water table) based on the SWRCB definition (i.e., TDS less than 3,000 mg/L) is depicted in Figure 4.2.2. However, TDS concentrations at the site are known to increase with depth (Jacobs, 1991).

Revised and/or clarified impact analysis and mitigation measures regarding surface hydrology and ground water are detailed in Section 5.2 of this Supplement.



LEGEND

- MW-1 GROUND WATER MONITORING WELL
- PC-1 PIEZOMETER CLUSTER
- P-8 PIEZOMETER
- MW-5 (2969) REPORTED TOTAL DISSOLVED SOLIDS CONCENTRATION (mg/L)
- 700 LINE OF EQUAL CONCENTRATION (mg/L)
- INTERPOLATED 3000 mg/L OF TOTAL DISSOLVED SOLIDS CONTOUR

0 4,000 8,000 FEET

SCALE

NOTES:

1. CONTOURS DEVELOPED BASED ON DATA COLLECTED DURING APRIL 1991 WHILE LESLIE SALT'S (CARGILL) BRINE PUMPS WERE PUMPING.
2. THIS DATA APPLIES TO THE UPPERMOST PORTION OF THE SATURATED ZONE. SUBSTANTIALLY HIGHER TDS CONCENTRATIONS OCCUR AT DEPTH IN THE SOUTHERN PORTIONS OF THE SITE.

SOURCE: JACOBS, 1991b.

FIGURE 4.2.2

TOTAL DISSOLVED SOLIDS CONCENTRATIONS IN GROUND WATEF

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC

MINERAL RESOURCES

1 REGIONAL MINERAL RESOURCES

Section 4.3 of the Draft EIR/EIS provides an overview of region-wide mineral resources. Mineral resource issues raised as comments on the Draft EIR/EIS focused on the calcium chloride resources of the Bristol Dry Lake area. The current producers of calcium chloride in the Bristol Lake area are Cargill and the National Chloride Company of America (National Chloride). National Chloride produces calcium chloride by dissolving crystalline salts in trenches located in the center of the Bristol Dry Lake about four miles southwest of the proposed landfill site. National Chloride supplements their operations with mineral-bearing ground water pumped from wells located on the eastern half of Section 22 approximately 1,500 feet east of the proposed landfill (see Figure 4.4.8 of the Draft EIR/EIS). The solar evaporation trenches precipitate sodium chloride salt as a waste product leaving the more soluble calcium chloride in the solution. While the exact methods used by Cargill are not known, Cargill indicates that ground water withdrawn from its wells located approximately 1,200 feet from the southwest corner of the proposed landfill (see Figure 4.4.8 of the Draft EIR/EIS) contains suitable concentrations of calcium chloride for economic processing.

2 ONSITE MINERAL RESOURCES

The extent of mineral resources on the proposed site are evaluated in Section 4.3 of the Draft EIR/EIS. As referenced in that section, the Bolo Station site was evaluated for mineral potential through a literature search, field reconnaissance and ground water sampling program conducted by Rail•Cycle (Jacobs, 1991). Section 22 has been classified by the BLM as being prospectively valuable for sodium mineral resources. BLM has not classified the site as being prospectively valuable for oil and gas, geothermal, or phosphate Leasing Act minerals. The selected lands are not within any known leasing area for leasing or Geothermal Steam Act minerals. Upon review of the results of these Rail•Cycle mineral investigations, the BLM concluded that the southern portion of the site would be reclassified as valuable for prospecting for calcium chloride, and prospectively valuable for sodium chloride.

No valuable minerals are currently being produced on the proposed site. National Chloride, however, is producing what they consider "production water" from wells in the west half of Section 22 (see Figure 4.4.8 of the Draft EIR/EIS). These wells will be relocated to private land south of the project site. Cargill is also producing from wells located approximately 1,200 feet from the southwest corner of the proposed site (see Figure 4.4.8 of the Draft EIR/EIS) that Cargill considers to produce economically valuable brines. The zone of influence from the extraction of ground water from Cargill's production wells extend beneath the southwestern portion of the site.

3. From limited sampling of borings on the proposed site north of the Cargill wells, the concentration of calcium and sodium chlorides decreases with distance from Bristol Dry Lake. There are no private or Federal mineral leases, permits, contracts, or applications for such for the proposed site. There is no evidence for the occurrence of any metallic minerals, such as heavy mineral placer deposits on the proposed site (Jacobs, 1991). Outcrops of lode type deposits are not within the project area.

4. As a result of the preliminary investigation and conclusions resulting from the Jacobs report (Jacobs, 1991), a more detailed investigation into the market for calcium and sodium chloride was made by the BLM (Waiwood, 1993). This investigation was made to determine whether there existed, within the proposed site, valuable deposits of calcium and sodium chloride that would be affected by the landfill, and to determine the present value of the selected public lands in the proposed exchange if valuable resources were present. Considered in the investigation were data acquired from National Chloride and Cargill, the only producing salt companies in the area, site-specific geotechnical data, and market conditions. In addition, subsequent to preparation of the Draft EIR/EIS, at the request of Rail•Cycle, a study was conducted by Condor Earth Technologies, Inc., which also examined the calcium and sodium chloride markets (Condor, 1993). The information presented by Condor was reviewed by the BLM as part of its investigation.

5. Subsequent to preparation of the Draft EIR/EIS, a 500-foot borehole was drilled in the southwest corner of Section 16, at the request of BLM, as part of a supplemental evaluation of mineral potential at the site. Soil logs and samples from this boring determined the base of the uppermost water bearing unit to be about 275 feet below ground surface at the southern boundary of the proposed landfill. The sediments within the aquifer were identified as alluvial fan or margin playa deposits and not of lakebed origin. Lakebed sediments have been determined to be the source of commercially valuable calcium chloride in the

Bristol Basin (Condor, 1993). Within the area of lakebed sediments sampled in this borehole (i.e., below 390 feet), mineral deposits were limited to several thin zones (less than 10 inches thick) of evaporite mineralization, consisting predominately of calcite and gypsum, encountered within clay layers. Based on the results of the analysis of the data from the 500-foot borings, it was concluded that "sustainable, leachable/mineable quantities of ground water are not present for economic development at this location" (Rust, 1993e).

6. The BLM investigation concluded that while the indications of the limited borehole sampling by Rail•Cycle showed a presence of calcium and sodium chloride, a present, valuable commercial operation could not be sustained from limited well yields and low calcium and sodium concentrations from well production from the site (Waiwood, 1993). Concentrations of calcium and sodium in the brine/water and well yields would not produce a profitable operation if capitalization and amortization of new solar facilities were required. If production from the site were to be dedicated to existing operations (National Chloride or Cargill), water requirements, at minimum, would be on the order of 500 acre feet per year (Waiwood, 1993). Geohydrologic conditions within the defined upper aquifer region (0 to 275 feet) at the site do not support the water well yields necessary to meet the minimum production levels. Water yields from tight clay, clay-silt, and sand lenses encountered below 300 feet in the 500-foot boring would yield less than the upper aquifer, and were determined not to be suitable for commercial water/brine production (Waiwood, 1993).

7. Commercial sand and gravel deposits were not found onsite (Waiwood, 1993). The material encountered is an adequate source for common fill and for possible use as cover material for the proposed landfill. A commercial market for aggregates does not exist at the proposed site as adequate resources for the major market, highway construction and maintenance, currently exist as sources closer to the use. A market for common fill material could exist once the project is started and throughout its life. However, fill resources were identified offsite, and with the exception of cut and fill activity resulting from landfill cell construction, no specific use of the fill potential of the site was identified (Waiwood, 1993).

8. Based on the above, BLM has concluded that while the proposed site may be prospectively valuable for calcium and sodium mineral resources, there are no known minerals of quantity and quality beneath the proposed landfill site that have present economic value (Waiwood, 1993). Bas on this finding, BLM and Rail•Cycle have agre to value the prospective mineral rights of t proposed exchanged federal lands based comparable values for minerals from recent priv transactions in the area, where minerals of simi prospective value were present. Because of t presence of possible fill materials on the propos site, a reservation of royalty interest on the fede selected parcels would be placed in the pate document to assure economic consideration of t interests of the United States should the minerals be commercially used and sold in t future.

4.3.3 CONDITIONS AFFECTING BRINE PRODUCTION AND QUALITY

4.3.3.1 Ground Water Flow and Well Production

1. As described in Section 4.4 of the Draft EIR/EI ground water flow within the Bristol Basin radial from the outlying recharge areas to t center of Bristol Dry Lake. A primary grou water flow path from which Cargill's obtai water originates in the Bristol Mountains a flows in a southwesterly direction to the Brist Dry Lake Basin. The ground water flow pattern shown in Figure 4.4.6 of the Draft EIR/EIS. T location of the Cargill wells is shown Figure 4.2.1 of this Supplement.

2. The aquifer underlying the Bristol Basin general exists under unconfined conditions. Ground wat flow may be complicated in the transition zo between the alluvial fan and the play Specifically, the interlayering of playa and f may result in localized confining layers, leading semiperched or semiconfined hydrologic conc tions. The location of the transition zone betwe fresh water and brackish water (i.e., high levels TDS) may fluctuate as a result of the balan between recharge of fresh water from upgradie and water discharge downgradient.

3. As shown in Figure 4.2.1, ground water flo under the proposed landfill site contributes to t Cargill production zone. Cargill wells a installed in the relatively incompressible, coars grained interbeds within the transition zone (Ru 1993d).

4.3.3.2 Ground Settlement and Ground Water Flow

1. Ground settlement has the potential to restri ground water flow. The amount of grou settlement which occurs is dependent on t degree of consolidation of the subsurface soi

As discussed in Section 4.1.3 of this Supplement, settlement of the soils underlying the proposed site could occur due to additional loads (such as the landfill) or due to ground water withdrawal.

Cargill operates three water production wells located immediately southwest of the proposed landfill site (i.e., approximately 1,200 feet). These wells have reportedly been in operation for about 20 years, pumping about 300 gallons per minute from a depth of about 270 feet. Cargill operating personnel have stated that the relative settlement of ground surrounding the well casing has been on the order of 12 to 18 inches (Jacobs, 1993b). Cargill has not reported any changes in its production from its wells as a result of the observed settlement during the operational life of these wells (Rust, 1993c).

Calculations by Jacobs determined that the drawdown created by the Cargill production wells has increased the overburden pressure of the sediments immediately surrounding the Cargill wells enough to produce settlement up to a maximum of 20 feet over the long term (Jacobs, 1993b). As previously stated, the Cargill wells are installed in coarser grained interbeds within the playa transition zone. As these interbeds are "over-consolidated," they are largely unaffected by ground settlement (Rust, 1993c). As discussed above, the 12 to 18 inches of settlement noted by Cargill at its wells appears to reflect the "over-consolidated" nature of the soil beneath the site, therefore the 20 feet of settlement calculated by Jacobs represents a very conservative estimate that was based on the soils being "normally-consolidated."

Revised and/or clarified impact analysis and mitigation measures regarding Mineral Resources are detailed in Section 5.3 of this Supplement.

4.4 AIR QUALITY

1. Comments to the Draft EIR/EIS requested refinement and reevaluation of analyses performed to address the following topics:

   - Vehicle idling emissions at rail crossings.
   - No Action Alternative.

2. The following sections discuss the issues associated with the affected environment for the above topics, and Section 5.4 of this document addresses potential impacts.

4.4.1 VEHICLE IDLING EMISSIONS AT RAIL CROSSINGS

1. Many of the rail crossings along the rail corridors between the proposed Bolo Station Landfill and potential MRF locations are not separated by underpasses or overpasses. These at-grade rail crossings require vehicles to stop and wait until trains have passed the crossing. The purpose of this refined assessment is to determine the magnitude and significance of air emissions from vehicles idling at rail crossings along the rail line between MRFs and the proposed landfill. The following data sources and methods were used to perform this analysis:

   - Average daily traffic (ADT) estimates reported in Appendix I of the Draft EIR/EIS.
   - Revisions to Draft EIR/EIS ADT estimates and new ADT estimates developed by Weston Pringle & Associates Traffic Engineering, Inc. (Weston Pringle & Associates, 1993) included in Appendix F.
   - Method for estimating future ADT based on existing ADT information, developed by Weston Pringle & Associates Traffic Engineering, Inc. (Weston Pringle & Associates, 1993) included in Appendix F.
   - Method for estimating vehicle waiting time at rail crossings developed by Weston Pringle & Associates Traffic Engineering, Inc. (Weston Pringle & Associates, 1993), included in Appendix F.
   - Air emission factors for vehicle idling, obtained from the California Air Resources Board's (CARB's) EMFAC7PC mobile source emission factor program.

2. Figure 4.4.1 shows the rail segments upon which vehicle delays were evaluated. The results of these analyses are discussed in Section 5.4.1 of this document.

4.4.2 NO ACTION ALTERNATIVE

1. The purpose of this analysis is to clarify and refine the No Action Alternative evaluation presented in Section 5.7.4 of the Draft EIR/EIS. The analysis presented in the Draft EIR/EIS was based on the following assumptions:

   - Los Angeles County would be required to fulfill future landfill capacity requirements by developing new landfills outside of the Los Angeles Basin, rather than expanding existing sites or developing new landfills inside the Los Angeles Basin.
   - An average one-way haul distance to these out-of-basin landfills would be approximately 100 miles.
   - 9-ton capacity packer trucks (waste collection trucks) would be used to transport waste to the out-of-basin landfills.
   - Transport of municipal solid waste to out-of-basin landfills would be consistent with South Coast Air Quality Management District (SCAQMD) Air Quality Management Plan (AQMP) Measure No. A-D-1, which supports out-of-basin transport of biodegradable solid waste.

2. Based on comments on the Draft EIR/EIS, the above assumptions have been modified, and the No Action Alternative has been reevaluated on the basis of the following assumptions:

   - Two of the seven MRFs planned to contribute waste to the proposed Bolo Station Landfill are assumed to transport 3,000 tons of waste each (i.e., a total of 6,000 tons) by rail per day out of Los Angeles County even if the Bolo Station Landfill is not operational.

     The CUP issued for the Commerce MRF requires transport of waste to a landfill serviced by rail (City of Commerce, 1993). Of the six remaining MRFs planned to contribute waste to the proposed Bolo Station Landfill, it is assumed that at least one of these facilities (possibly a MRF approved for the Puente Hills Landfill) will be committed to transporting waste by rail to a landfill out of Los Angeles County. This is considered a conservative assumption, since it is likely that more of these planned MRFs, when constructed, would transport waste by rail to a landfill out of Los Angeles County. For example, the EIR prepared for the Puente Hills

Landfill indicates that residual waste from the MRF to be located at the landfill is intended to be "hauled by rail to a remote disposal location, if available" (Los Angeles County, 1992). The East Carbon Canyon Landfill in Utah, and WMNA's Franconia Landfill, in Mohave County, Arizona, have the potential to receive waste from the Commerce and Puente Hills MRFs.

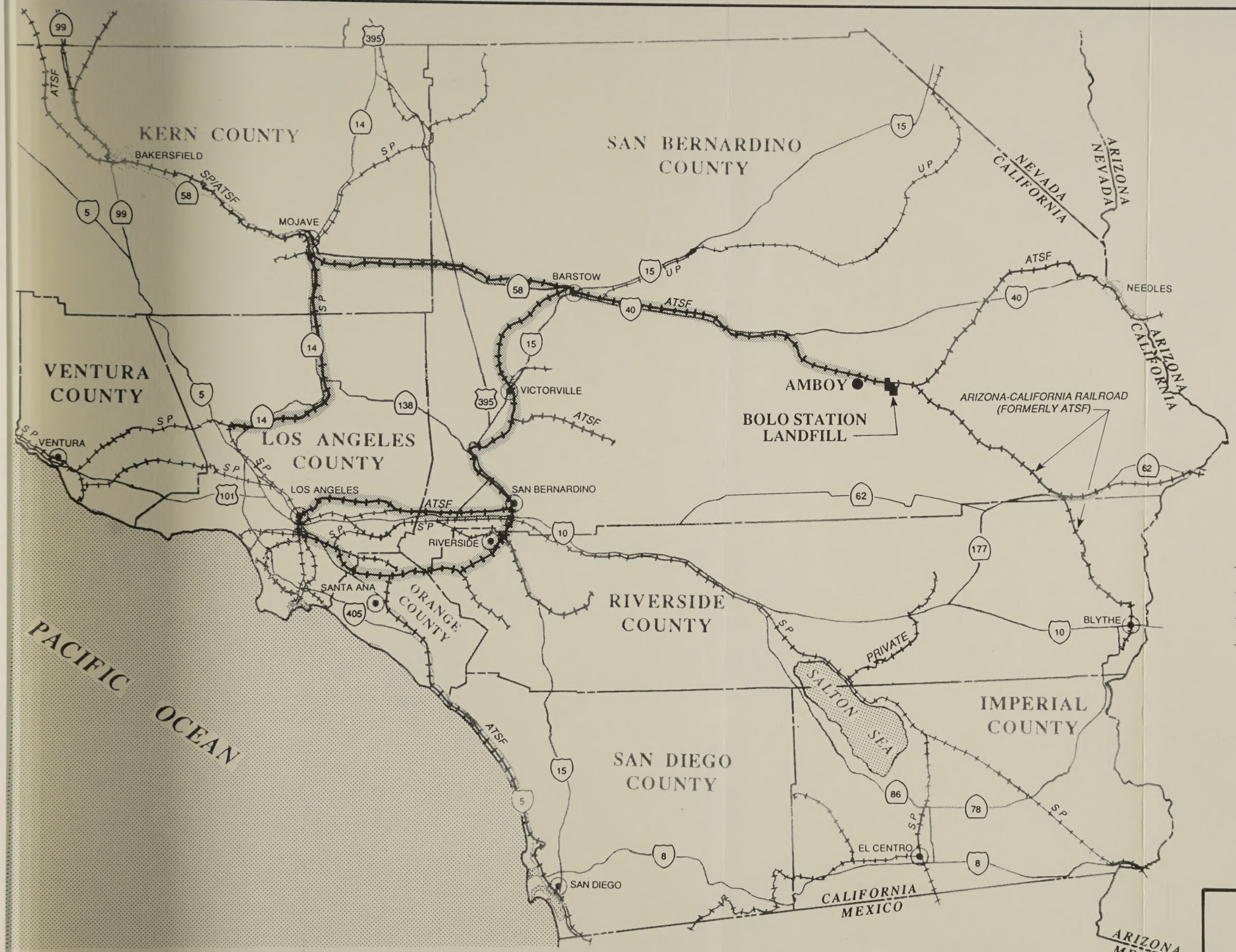
At least as an interim measure, existing and potential landfill sites in the Los Angeles basin would be expanded to meet remaining future landfill capacity requirements not satisfied by the Commerce and Puente Hills MRFs.

Of the waste projected to have been disposed of at the proposed Bolo Station Landfill, approximately 6,000 combined tons per day would be transported from the Commerce and Puente Hills MRFs by rail to landfills out of Los Angeles County. Approximately 70 percent of the remaining municipal solid waste from Los Angeles County originally projected to be transported by rail to the proposed Bolo Station Landfill would, under the No Action Alternative, be transported first to a regional MRF or transfer station, and then to remote Los Angeles County landfills by 22-ton capacity trucks (transfer trucks), traveling about 45 miles, one-way, to the landfill (round trip of 90 miles). This distance is calculated as the average one-way mileage from the central Los Angeles area (i.e., Commerce) to two remote landfills in northern Los Angeles County: Chiquita Canyon (50 miles) and Sunshine Canyon (40 miles).

Approximately 30 percent of the remaining municipal solid waste from Los Angeles County under the No Action Alternative would be transported directly to local limited-capacity Los Angeles County landfills by 9-ton capacity trucks (packer trucks), traveling about 22.5 miles, one-way, to the landfill (round trip of 45 miles). This distance is based on the assumption that several local Los Angeles area landfills may remain open at limited capacities, and that the average one-way distance from curbside to landfill would range from 20 to 25 miles.

- SCAQMD AQMP Measure No. A-D-1 supports transport of refuse-derived fuel, not solid waste, to out-of-basin energy recovery facilities via electrified rail corridors. Therefore, the assumption included in the Draft EIR/EIS regarding out-of-basin transport of solid waste is not valid and has been deleted from the analysis included in the Supplement.

3. Revised and/or clarified impact analysis and mitigation measures regarding Air Quality are detailed in Section 5.4 of this Supplement.



LEGEND

RAIL LINE SEGMENTS FOR TRANSPORTATION AND NOISE ANALYSES

- BOLO STATION TO BARSTOW (ATSF)
- BARSTOW TO MOJAVE (ATSF)
- MOJAVE TO SANTA CLARITA VALLEY (SP)
- BARSTOW TO VICTORVILLE (ATSF)
- VICTORVILLE TO SAN BERNARDINO (ATSF)
- SAN BERNARDINO TO LOS ANGELES (SCRRA)
- SAN BERNARDINO/RIVERSIDE/ LOS ANGELES (ATSF)

INTERNATIONAL BOUNDARY

STATE BOUNDARY

COUNTY BOUNDARY

MAJOR HIGHWAY

MAJOR RAILROAD LINE

ATSF ATCHISON,TOPEKA, AND SANTA FE RAILROAD

S P SOUTHERN PACIFIC RAILROAD

U P UNION PACIFIC RAILROAD

SCRRA SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY

0 25 50 MILES

SCALE

RENCE: U.S.G.S. BASE MAP OF CALIFORNIA, SOUTHERN ONE-HALF. DATED 1968 AND REVISED IN 1981.

SCAG, 1988.

FIGURE 4.4.1

RAIL TRANSPORTATION SEGMENTS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

NOISE

This evaluation has been conducted in response to comments on the Draft EIR/EIS requesting clarification of the potential noise impacts related to train movements between the potential MRFs and the proposed Bolo Station Landfill. In addition, this section responds to specific concerns raised by the cities of Ontario, Fontana, and Rancho Cucamonga regarding potential rail noise impacts in the vicinity of their respective communities.

The Draft EIR/EIS presented an evaluation of rail noise impacts which was restricted by the following constrains:

- Noise impacts were evaluated only for San Bernardino County.
- Only one speed limit and train length was evaluated for each rail segment.
- All potential Rail•Cycle trains were assumed to travel on each of the rail segments evaluated.
- All Rail•Cycle trains were assumed to travel at night.

The above constraints were reevaluated for the Supplement. Refined noise analyses were performed using the following constraints and assumptions:

- Noise impacts were evaluated for San Bernardino, Riverside, Orange, Los Angeles, and Kern counties. See Figure 4.4.1 for the rail segment analyzed.
- Passenger, freight, and Rail•Cycle trains were evaluated separately with respect to the following parameters:
  - Train length
  - Train speed
  - Operation schedule
- Rail•Cycle trains were apportioned only to the rail segments serving the communities in which MRFs are expected to be operated.

The following data sources were required to perform this analysis:

- The methodology for estimation of rail noise impacts summarized in Appendix J of the Draft EIR/EIS.
- Revisions to data used in the Draft EIR/EIS rail noise analyses, including the following:
  - Refined projections of the number of Rail•Cycle trains to travel on each rail segment.
  - Number, length, and time of day for Metrolink and Amtrak trains traveling on each rail segment.
  - Number, length, and time of day for freight trains traveling on each rail segment.
  - Maximum allowed speed (miles per hour [mph]) along each rail segment for each type of train (i.e., Rail•Cycle, passenger, freight).

5. Revised and/or clarified impact analysis and mitigation measures regarding Noise are detailed in Section 5.5 of this Supplement.

CHAPTER 5.0
REVISED/CLARIFIED IMPACTS AND MITIGATION MEASURES

5.0 REVISED/CLARIFIED IMPACTS AND MITIGATION MEASURES

This chapter provides the results of revised and/or clarified analysis for specific areas in the Draft EIR/EIS. The areas addressed in this chapter are as follows:

- Geology and Soils
- Surface Hydrology and Ground Water
- Mineral Resources
- Air Quality
- Noise

GEOLOGY AND SOILS

Subsequent to distribution of the Draft EIR/EIS, follow-up fieldwork and analysis was conducted by Rail•Cycle to verify and/or clarify geologic and soil conditions at the proposed Bolo Station site. This section summarizes and incorporates the findings of the follow-up analysis conducted to verify the following:

- Absence of Holocene faults beneath the site.
- Potential for buried gravel channels beneath the site.
- Ground settlement due to loading on foundation soils and due to ground water withdrawal.
- Effect of ground settlement on liner performance and on the ground water regime.

1 POTENTIAL ENVIRONMENTAL IMPACTS

1.1 Structure/Faults

1.1.1 Faulting and Seismicity

As detailed in Section 4.1 of the Supplement, the absence of Holocene faulting has been verified by the 1992 geophysical survey and trenching conducted by Rail•Cycle in consultation with the RWQCB (Jacobs, 1993a). The subsequent geophysical survey also confirmed that the north-south trending lineament located southerly of the site (identified as Lineament A in Section 5.2.1.1 of the Draft ER/EIS) is not fault related and does not extend into the site (Jacobs, 1993a).

Based on the results of the geotechnical investigations discussed in the Draft EIR/EIS, and the verification evaluation discussed in Section 4.1 of this Supplement, the proposed landfill will not be impacted by seismic activities.

1.1.2 Buried Gravel Channels

The geophysical survey and associated borings also verified the absence of buried gravel channels below the ground water table (see Section 4.1.2.4). No adverse impacts, therefore, are anticipated.

5.1.1.2 Soil Consolidation/Ground Settlement

1. As discussed in the Draft EIR/EIS, ground settlement at the proposed landfill would occur due to the following:

   - Ground settlement of the underlying soils due to the additional load (i.e., weight of solid waste) from the proposed action.
   - Ground settlement of the underlying soils due to ground water withdrawal.

   This section provides updated information and analyses on ground settlement due to the load of the landfill on foundation soils and settlement due to ground water withdrawal.

5.1.1.2.1 Ground Settlement Due to Loading on Foundation Soils

1. The range of calculated ground settlement has been refined based on the more recent soil sampling information (see Section 4.1.3 of this Supplement) and additional analysis to quantify ground settlement due to ground water withdrawal (Jacobs, 1993b). The maximum potential ground settlement at the proposed site, including both the effects of landfilling and combined ground water withdrawal, has been calculated to range from between 4.8 to 15.6 feet. This range brackets the anticipated settlement calculated using the results of both the 1991 ("normal" to "slightly over-consolidated") and 1992 ("over-consolidated") soil sampling and analysis (Jacobs, 1991; 1993b). This range is representative for the landfill footprint. The upper bound of this estimated range of settlement (15.6 feet) is based on "normally consolidated" soils, while the 4.8 feet is based on the 1992 results and is based on "over-consolidated" soils. The maximum settlement at the site would occur at the southwestern portion of the proposed site (Landfill Cell No. 1).

2. Because of the cohesive soils in this area (Landfill Cell No. 1), the relatively shallow depth of ground water compared to the northern portion of the site, and the proximity to the Cargill production wells, the southwest corner of the landfill is the area of the site with the maximum potential settlement. Moving north from this corner, the soils become cohesionless and less compressible, and the depth to ground water increases. The southwest portion of the site, therefore, served as the control point for landfill design related to ground settlement. Rail•Cycle has chosen to analyze ground settlement for purposes of final design assuming the soils beneath this part of the site are "normally

consolidated" resulting in a maximum calculated settlement of 15.6 feet (Jacobs, 1993b; Rail•Cycle, 1993b).

3. A number of factors in the analysis conducted by Jacobs result in a conservative estimate of the calculated maximum settlement, which is based on soils beneath the site being considered "normally consolidated." The results of the recent soil analysis indicates that the soils beneath the site are "over-consolidated" rather than "normally-consolidated" (Jacobs, 1993b; Rust, 1993c). Specifically, the data from the 500-foot boring drilled by Rail•Cycle in the southwest corner of Section 16 in April 1993, suggests that soils at a depth of 500 feet are "over-consolidated" by up to 300 percent and are not expected to be able to settle appreciably more (Rust, 1993e). In addition, Jacobs' calculated maximum settlement of 15.6 feet is based on an assumption that the soils are "normally-consolidated" and that these types of soils extend to a depth of 2,000 feet. As discussed in Section 4.1.2.3.2, seismic reflection data indicates that depth to bedrock beneath the site is 1,000 feet rather than 2,000 feet, which provides substantially less depth for consolidation of sediments (Jacobs, 1993a). Therefore, using the calculated estimate of a maximum settlement of 15.6 feet is conservative.

4. Jacobs calculated a maximum settlement 20 feet at the Cargill wells due to ground wat pumping alone based on the assumption that t soils are "normally consolidated" to "slight over-consolidated." Observed settlement of t Cargill wells is estimated to be in the range approximately 2 feet over the past 20 years. T difference between the calculated and observ settlement due to ground water pumping Cargill indicates that the "normally to slight over-consolidated" assumption used by Jacol overpredicts actual settlement. This overpredictio of settlement supports the conclusion th settlement due to ground water pumping ar landfill loading will be less than the conservati 15.6 feet.

5. In the event Cargill increases its rate of grour water withdrawal, a corresponding increase in t rate of ground settlement in the vicinity of t Cargill wells would also occur. As requested b the BLM, Rail•Cycle evaluated the potential effe of a 50 percent increase in the Cargill pumpin rate and calculated that such an increase woul result in an additional maximum settlement due t ground water withdrawal of 0.2 to 0.7 fe (Rail•Cycle, 1993b). This 0.2 to 0.7 feet included in the conservative settlement range 4.8 to 15.6 feet.

5.1.1.2.2 Ground Settlement Due to Ground Water Withdrawal

Cargill Pumping

1. Additional analysis was conducted to quantify the potential ground settlement from the landfill in conjunction with ground water withdrawal by Cargill. The analysis was conducted for both "normally to slightly over-consolidated" and "over-consolidated" soil conditions and has been incorporated into the maximum settlement range of 4.8 to 15.6 feet at the proposed site.

2. The Cargill production wells have caused ground water drawdown that extends under the proposed site. The drawdown results in ground settlement by reducing hydraulic pressure in the soil pore space and its associated buoyancy effect.

3. Land settlement at the project site would occur with or without the landfill due solely to ground water withdrawal. This effect would only be substantial if the soils are "normally consolidated" (as assumed for the "worst-case" settlement analysis). The potential settlement at the proposed landfill site due to Cargill pumping decreases with distance from the wells and is a factor in the estimated range of 4.8 to 15.6 feet of settlement at the proposed site.

Onsite Water Pumping

1. Estimates of the water supply requirements durin the life of the project have been update by Rail•Cycle to indicate that durin approximately the first 90 days of construction, u to 1,400 gallons per minute will be required due t anticipated high initial construction water deman For the remaining, active life of the propose landfill (i.e., 60 to 100 years), approximately 7 to 100 gallons per minute will be required.

2. The Draft EIR/EIS specified that the onsite well would be located near the northeast corner c Section 9. Under the refined landfill design, onsit water uses are proposed to be met by relocatin the wells to the southeast corner of Section 3 near Route 66 (see Figure 3.1).

3. A simulation of the proposed water supply well a the landfill and its effect on the surrounding aquife was conducted for the previously proposed wel location in Section 9 (Rust, 1993b). The stud concluded that an adequate water supply fo projected water requirements at the propose landfill could be met by wells located in th northeast corner of Section 9 (Rust, 1993b). Th results of the modeling determined that at th Section 9 well location, less than 3 feet o

drawdown is expected beneath the landfill footprint to support the landfill water supply requirements for the duration of ground water extraction (about 100 years). The minor drawdown would not be expected to contribute to ground settlement beneath the proposed landfill.

Although the model was based on the well location as identified in the Draft EIR/EIS, in the northeastern corner of the site in Section 9, the modeling also considered the effects of relocating the wells to the southeast corner of Section 33, as currently proposed. At the Section 33 location drawdown would not be anticipated to exceed 25 feet at anytime during the operational life. As the wells would be more than two miles from the proposed landfill footprint, this drawdown is not expected to contribute to ground settlement within the landfill footprint.

iz Valley Ground Water Pumping

CLC currently draws approximately 5,000 acre-feet per year from the ground water basin for agricultural uses in the Cadiz Valley (URS, 1993). The company is proposing to expand their existing 1,440-acre vineyard and citrus orchard to encompass a total of 9,600 acres. Upon full expansion, to occur over a period of 10 to 15 years, the agricultural development is anticipated to require 30,000 acre-feet per year of ground water for irrigation.

A ground water drawdown analysis was conducted for the CLC Draft EIR for the proposed agricultural use expansion for two different ground water recharge estimates (3,500 acre-feet per year and 20,000 acre-feet per year). Under both scenarios, which are believed by CLC to bracket the actual ground water recharge level, the drawdown cone at full development (30,000 acre-feet per year) for the agricultural water pumping would extend into the proposed Bolo Station site.

Ground subsidence at the proposed Bolo Station site due to the CLC ground water extraction would not be anticipated to be significant (URS, 1993). Maximum drawdown under the Bolo Station site due to the CLC project is estimated at approximately 8 feet near the Cargill wells (URS, 1990). This additional ground water drawdown is estimated to increase maximum ground settlement beneath the landfill by 0.3 to 0.4 feet (Rail•Cycle, 1993b). This 0.3 to 0.4 feet is included in the conservative settlement range of 4.8 to 15.6 feet.

nbined Ground Water Pumping

Based on the potential ground water drawdown and resulting ground settlement for each of the three situations discussed above, a combined additional maximum settlement was calculated. Using the same assumptions as those used for the previous settlement calculation, the combined effect of a potential 50 percent increase in the Cargill pumping rate, Rail•Cycle's proposed onsite well, and the potential increase in the CLC pumping rate, the range of calculated maximum settlement beneath the landfill increased by 0.5 to 1.1 feet (Rail•Cycle, 1993b). This 0.5 to 1.1 feet is included in the conservative settlement range of 4.8 to 15.6 feet.

2. As the landfill would be designed for the maximum calculated settlement, this settlement would not impact the proposed landfill.

5.1.1.2.3 Potential for Differential Settlement

1. The potential for ground settlement tends to be higher on the southern portion of the site and lower on the northern portion of the site. This is because of the predominantly cohesive soils underlying the southern portion of the site. The southern portion of the proposed landfill footprint is located on a transitional zone that changes from predominantly cohesionless soils on the north to predominantly cohesive soils on the south. Based on current knowledge of the geologic environment of playa basins and their interface with alluvial fans, and as confirmed by geophysical surveys and drilling programs, the onsite change from cohesive soil to cohesionless soil appears to be gradual with no abrupt change in lithology apparent underlying the proposed landfill footprint.

2. Differential settlement may occur when loads are placed on dissimilar soil types, at or near faults or fissures, or at discontinuities between soil types. No conditions have been observed at the proposed site that would cause differential settlement.

3. As described in the Draft EIR/EIS (Section 5.2.1.2.1), the filling approach for the landfill cells would result in nearly uniform loading on foundation soils, and therefore, would not result in significant differential settlement at interfaces between cells. The uniform placement of landfill loads during construction was one of the assumptions used in the settlement calculation.

4. Settlement in the form of "tilting" of the landfill bottom may result from different amounts of vertical settlement across a large horizontal distance. The slope of the tilting is expected to be in the range of less than 0.01 (vertical:horizontal). A slope of 0.01 is equivalent to 0.1 foot of settlement over a 10-foot distance. Due to the nature of the soils underneath landfill loads and the loading sequence, the occurrence of a significant amount of abrupt differential settlement is

considered remote (Jacobs, 1993b). Rather than differential settlement, it is expected that settlement will be relatively uniform and that resulting changes in surface elevations will also be relatively uniform with no abrupt changes.

5. As settlement occurs and the bottom of the landfill tilts, the liner system will stretch to conform to the new bottom profile. The calculated maximum slope of the tilting at the proposed Bolo Station site is 0.01 (vertical:horizontal). This calculated maximum slope will cause the flexible membrane liner (FML) components of the liner system to stretch by 0.005 percent or 5 feet per 100,000 feet of linear length of liner (Rail•Cycle, 1993c). Rail•Cycle proposes to use 60-mil HDPE as the FML components of the liner system. HDPE has a yield strain of 13 percent or 1,300 feet per 100,000 feet of linear length (Rail•Cycle, 1993c). Yield strain is the amount of stretch a material can resist without permanent deformation. Beyond the yield point, the material deforms permanently. Based on the above, the selection of 60-mil HDPE for the FML components of the liner system for the proposed Bolo Station Landfill provides a conservative factor of safety based on site-specific conditions.

5.1.1.2.4 Impact of Settlement on Ground Water Regime

1. The maximum potential settlement will be taken into account in designing each area of the landfill. As discussed in Section 5.1.1.2.1, this settlement includes up to 15.6 feet due to the combined effects of ground water withdrawal and landfilling. Based on the design and engineering requirements implemented by Rail•Cycle, settlement would not cause the separation between the landfill liner and the capillary zone to be less than the 5 feet separation mandated by CCR Title 23 (see Section 5.2.1.2.2 for a more detailed description of the proposed separation).

5.1.1.3 Overall Impact of Ground Settlement

1. As discussed above, the combined impact of ground settlement resulting from soil consolidation caused by the additional loading of foundation soils by the landfill, and by the withdrawal of ground water will not be significant.

5.1.2 SUPPLEMENTAL MITIGATION MEASURES

5.1.2.1 Structure/Faults

1. Additional research and field exploration conducted to evaluate the potential presence of Holocene faulting and buried gravel channels did not yield any evidence to suggest the presence of these features. Therefore, no supplemental mitigation measures regarding these issues are required.

5.1.2.2 Ground Settlement

1. Based on the subsequent soil sampling analysis and the refinement of the landfill to a the 100-year floodplain, the required separa between the refuse and the ground water t would be maintained. Differential settlemer projected to be minimal. The soil consolida design factors for "normally consolidated" "slightly overconsolidated" shall be used for landfill engineering design to assure that greatest possible settlement conditions anticip at the site are addressed.

SURFACE HYDROLOGY AND GROUND WATER

POTENTIAL ENVIRONMENTAL IMPACTS

.1 Surface Water

.1.1 Redesign for the 100-Year Floodplain

As shown in Figure 3.1, the landfill cell layout has been reconfigured to avoid landfilling within most of the area which is within the 100-year floodplain. The reconfiguration affects the former Landfill Cells numbered as 11, 18, and 21 in the Draft EIR/EIS. A portion of the southernmost corner of the site is no longer planned for landfilling. Under the reconfiguration, there are only minor projections of the 100-year floodplain boundary into proposed landfill cells. These occur within Landfill Cell Nos. 11, 12 and 18 (under the revised numbering shown in Figure 3.1).

As required by CCR Title 23, Chapter 15, and Subtitle D, the proposed landfill would be protected from the 100-year flood. Engineered berms would be constructed on the perimeter of the landfill to protect the portions of Landfill Cell Nos. 11, 12 and 18 from the 100-year floodplain. Therefore, the proposed landfill would not be impacted by a 100-year flood.

In addition to removing the majority of landfill cells from the 100-year floodplain, the reconfiguration of the southwest corner of the landfill also avoids the most compressible soils at the site. As discussed in Section 4.2.2.1.2 of the Draft EIR/EIS, the southern corner of the landfill is more susceptible to ground settlement due to its proximity to the playa basin and the fine grained, cohesive soils in this part of the site.

.1.1.2 Design Refinement for 100-Year Flood

As depicted in Figure 3.1, the basic stormwater run-on and runoff features for the proposed landfill have not changed since preparation of the Draft EIR/EIS, but they are being refined as part of final design. Surface water flows from north of the ATSF rail line would be intercepted by an unlined earthen diversion channel located directly south of the railway and would be diverted east of the site. Stormwaters collected from portions of the landfill would be directed into a perimeter drainage channel which discharges into reconfigured sedimentation basins located at the southern boundary of the landfill.

Stormwater run-on and runoff control structures, including temporary and permanent diversion ditches, sedimentation and retention basins, are designed to accommodate a 100-year, 24-hour storm event. This is a refinement since the distribution of the Draft EIR/EIS which stated that some of these features would be designed to accommodate a 25-year, 24-hour storm. Therefore, the proposed landfill would not be impacted by the 100-year, 24-hour storm event.

5.2.1.2 Ground Water

5.2.1.2.1 Ground Water Quantity and Flow

Impact of 100-Year Storm

1. Fluctuation of the ground water table in the Mojave Desert resulting from precipitation is dependent upon several factors (i.e., adsorptive capacity of the soil types, temperature and wind, humidity and evaporation rate, and duration and concentration of the storm). Infiltration of stormwater during and following a 100-year, 24-hour storm would caused a limited rise in the water table beneath the proposed site.

2. The estimated rise in the ground water was calculated by Rail•Cycle and included input parameters for both direct infiltration and delayed infiltration. Direct infiltration occurs immediately and for a brief period of time following the storm event. Delayed infiltration results from ponded or standing water. Conservative assumptions for the model included the elimination of absorption and evapotranspiration.

3. The storm event used for the calculation was the 100-year, 24-hour with 2.5 inches falling on the basin floor, 3.0 inches along the surrounding mountain front, and 3.5 to 4.5 inches in the surrounding mountains. The total accumulation of water on the Bristol Lake playa was estimated at 16 feet, causing water to rise up to the 620-foot surface contour line.

4. A ground water table elevation rise of approximately 5 inches was estimated due to direct infiltration and the assumption that 85 percent of precipitation falling during the event would occur as runoff to the playa (Jacobs, 1993b). An additional 1 inch rise, for a total of 6 inches, was estimated due to ponded water in the lake (delayed infiltration). Ponded water was considered to remain for a period of up to two years, eventually evaporating and/or seeping into the ground.

Impact of Settlement on the Underlying Aquifer

1. Settlement related to the landfill would have a negligible impact on ground water flow in the underlying aquifer. Although the horizontal permeability of the clayey beds beneath the site could be reduced because of the estimated ground settlement, this settlement is not critical because most of the ground water is transmitted

horizontally through the sandy layers. The sandy aquifer materials are relatively cohesionless as compared with the clayey materials. Based on in situ penetration test results and settlement calculations, the average strain (ratio of decrease in thickness to original thickness) on sandy soils will be less than 0.1 percent and a conservative estimate of the resultant decrease in horizontal permeability is 1 percent (Jacobs, 1993b; Jacobs, 1993c).

2. An evaluation was also conducted to estimate the amount of pore fluid which would drain out of subsurface soils due to the landfill load. Flow in the aquifer under the landfill is projected to increase by less than 0.0025 percent (Jacobs, 1993b). This minimal increase would have a negligible effect on the ground water flow, therefore, settlement from the proposed landfill would not impact ground water flow.

Impact of Large Lined Areas on Ground Water Recharge

1. Upon completion 60 to 100 years in the future, development of the proposed Bolo Station Landfill would result in 2,100 acres being covered by an impermeable surface that would change the local hydrologic condition and ground water recharge. Ground water beneath the site is derived primarily from ground water flow from the Bristol Mountains via the Orange Blossom Wash. This drainage encompasses approximately 90 square miles north of the proposed site.

2. The Mojave Desert receives an average of approximately 3 inches of precipitation per year. Aquifer recharge is primarily due to percolation of precipitation during the infrequent winter storms. Ground water recharge in the 90 square mile drainage occurs predominately north of the proposed site where surface and subsurface soils are primarily gravely and sandy.

3. The 2,100 acres of the proposed landfill represents approximately 4 percent of the 90 square mile drainage area. The area in which the proposed landfill is located is immediately south of the ATSF rail line. The rail line is protected by levees and dikes that, for the past 100 years, have diverted stormwater surface flow to the east and west of the majority of the proposed landfill site. Therefore, the diversion of stormwater surface flow around the proposed landfill represents a continuation of a long-term diversion of surface flow.

4. Precipitation falling on the proposed landfill would be diverted off the site and into sedimentation basins where it would be allowed to infiltrate. Given the relatively small size of the landfill in relationship to the size of the drain and as the majority of ground water recharge ir drainage area occurs north of the site, the im from the loss of surface infiltration due development of the landfill is conside negligible.

Impact of Onsite Well Pumping

1. Estimates of the water supply requirements du the life of the proposed project indicate that du the first approximately 90 days, up 1,400 gallons per minute would be required, to anticipated high initial construction w demand. Following this initial 90-day peri approximately 70 to 100 gallons per min would be required for the active life of the pro to support the operation of the landfill, visit center, and fire control systems.

2. The Draft EIR/EIS specified that the onsite w would be located near the northeast cor of Section 9 in the vicinity of P-8. Under refined landfill design, onsite water u are proposed to be met by relocating the well the southeast corner of Section 33 (Figure 3.1).

3. A modeling effort to simulate the effects on aquifer produced by the long term pumping of proposed water supply well was conducted (R 1993a). Although the model was based on well location as identified in the Draft EIR/EIS, the northeastern corner of the site in Section the study also considered the effects of relocati the well to the southeast corner of Section 33, currently proposed. The model was based on estimated 1,400 gallons per minute for 90 da during the initial construction period, and 100-gallons per minute pumping rate for remaining 60- to 100-year life of the landfill.

4. The model used was the U.S. Geological Surv (USGS) quasi three-dimensional, finite-differen model MODFLOW. The aquifer geometry a hydraulic characteristics used for the modeling w based on the Phase II geotechnical investigati report (Jacobs, 1991). The primary results of t simulation at the well location in the northea corner of Section 9 are as follows:

   - There is adequate water supply to meet the projected needs of the proposed landfill fro wells located at the northeast corner of Section 9, assuming that there is no significant vertical ground water variability
   - The drawdown at the well location is predicted to be less than 3 feet after 100 years of pumping at a pumping rate of 100 gallons per minute.

- The capture zone of the pumping well is predicted to remain laterally within ground water that is of potable quality.

Although no detailed physical investigations of the hydrogeology of the Section 33 well location were performed, the effect of moving the proposed water supply wells to this location can be interpreted based on knowledge of the depositional environment at the site (Jacobs, 1991). The following observations for wells in Section 33 are noted (Rust, 1993a):

- Sediment grain size increases to the north within the alluvial fan.
- Aquifer parameters (hydraulic conductivity, storativity, etc.) also increase to the north.
- Depth to bedrock at the Section 33 location is within about 75 feet of the Section 9 location.
- Adjacent bedrock geometry is steeper to the west of Section 33 well location, but greater thickness of aquifer is available to the east.
- Ground water elevations should be within 5 to 10 feet of the Section 9 well location.
- Ground water quality improves to the north due to increased freshwater recharge.
- Section 33 well location is more than three miles north of the Cargill production wells (one mile further away than the Section 9 well location).

While the depth-to-bedrock geometry at the Section 33 location should have the effect of increasing the overall anticipated radius of influence and drawdown relative to the Section 9 location, the more distant location from this well relative to Section 9 will greatly reduce its potential for impact to the Cargill production wells. Additionally, fresher ground water is anticipated to be collected since the aquifer is thicker and should exhibit greater flow characteristics.

The simulated ground water modeling conducted by Rail•Cycle indicates that the proposed ground water pumping of 130 acre-feet per year for onsite uses would not adversely affect other ground water users in the area (i.e., Cargill, National Chloride, or CLC). However, as described in Section 4.2.2 of this Supplement, the ground water recharge rate in the basin is uncertain, and proposed future ground water use for the CLC agricultural operation is substantial. Cumulative project impacts to the ground water basin, primarily due to CLC, may result in overdraft of Bristol Basin. In the event the Bristol Basin is in overdraft, the use of 130-acre-feet of water per year by the proposed landfill would be considered an unavoidable adverse impact.

5.2.1.2.2 Impacts to Ground Water Quality

Separation Between Wastes and Ground Water

1. CCR Title 23, Chapter 15 requires that new landfills be sited, designed, constructed, and operated to assure that wastes would be a minimum of 5 feet above the highest anticipated elevation of underlying ground water. Underlying ground water is defined to include water which rises above the zone of saturation due to capillary forces in the soil.

2. Design base grades for each area of the landfill have been established to account for the maximum settlement as well as the projected capillary zone. A uniform 9 feet was allowed for the design for the capillary zone, which has been estimated to range between 3 to 9 feet (Jacobs, 1993b). Also included in the calculation for the minimum separation between the wastes is the maximum rise in the water table. This includes an estimated 6-inch rise in the water table in the event of a 100-year storm, and includes the maximum possible rise in the water table due to cessation of pumping at the Cargill wells.

3. At the lowest elevation of landfill construction, in the vicinity of the leachate collection sumps, capillary rise would be limited by construction of an engineered break consisting of a layer of permeable gravel or geonet. All landfill liner construction would occur 5 feet above this engineered break or above the assumed 9-foot natural rise.

4. Figure 5.2.1 depicts the maximum required separation between the landfill liner and the water table. This condition reflects the maximum estimated ground settlement of 15.6 feet. Based on the refined settlement calculations, this maximum would occur at the southwest corner of the proposed landfill.

5. As shown in Figure 5.2.1, allowing for the various components discussed above, the maximum required separation between the base of the landfill and the highest anticipated water table is approximately 29.6 feet. The most conservative settlement condition, as previously noted, would occur in the southwest corner of the site. This would also be in the vicinity of the leachate collection sumps and, therefore, in an area where the capillary rise could be limited by an engineered break. The 29.6 feet of separation

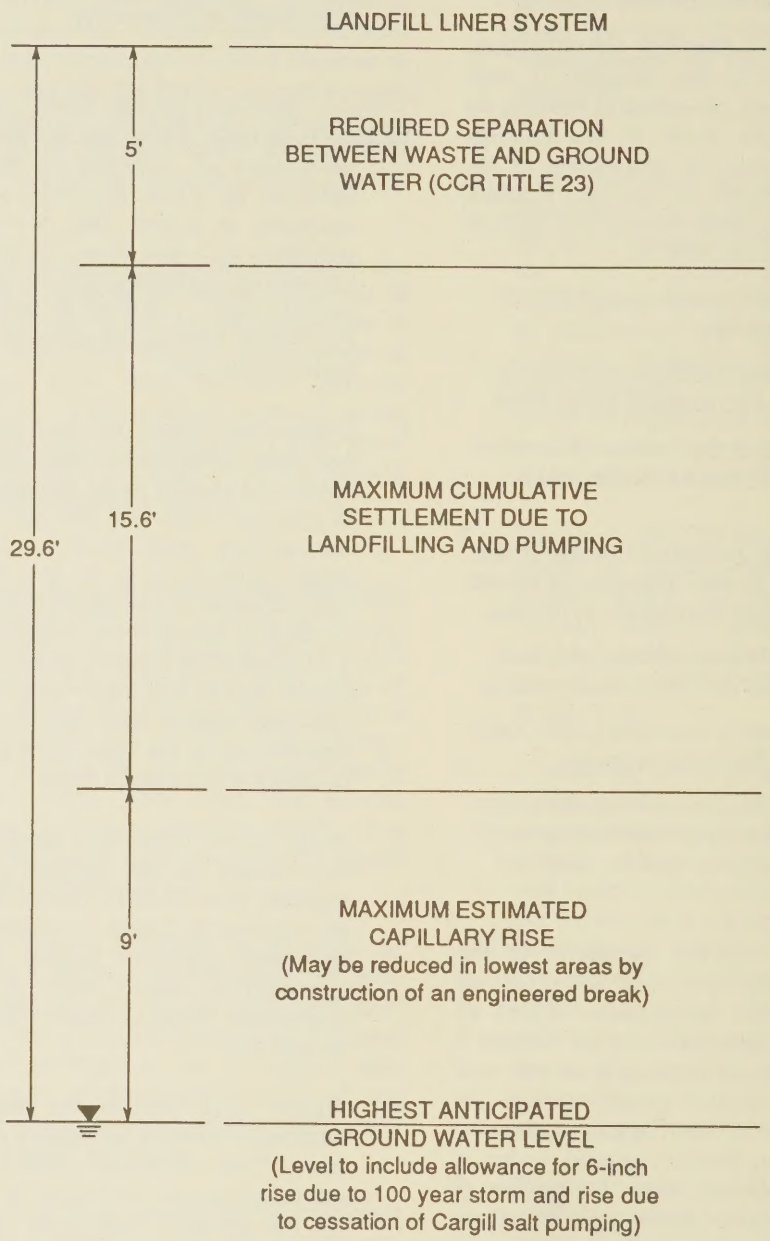


FIGURE 5.2.1
SCHEMATIC
MAXIMUM REQUIRED SEPARATION
BETWEEN LANDFILL LINER
AND WATER TABLE
RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

between the landfill liner and ground water capillary zone would be achieved under all conditions. As previously noted, the capillary rise over the landfill footprint ranges from 3 to 9 feet and a uniform rise of 9 feet was allowed for design purposes. At the lowest elevation of landfill construction, in the vicinity of leachate collection sumps, capillary rise would be limited by construction of an engineered break consisting of a layer of permeable gravel or geonet. All landfill liner construction would occur 5 feet above this engineered break or above the assumed 9-foot natural rise. Due to the varying ground water depth and soils conditions across the proposed site, the design level of excavation would also vary (i.e., excavation depth would be designed to maintain the required minimum separation based on predicted settlement and ground water rise at specific locations across the site).

In addition to the separation between the landfill liner and the ground water capillary zone, the use of Rail•Cycle's proposed double liner system provides a physical barrier between the waste and ground water. The double liner system in conjunction with the unsaturated zone monitoring (UZM) system and downgradient monitoring wells, and the requirements of CCR Title 23 to implement corrective action in the event a release occurs from the landfill, assures that the proposed landfill would not impact ground water downgradient from the site.

tial Gas and Leachate Migration

Numerous safeguards have been incorporated into the design of the landfill to minimize the potential of gas and leachate migration (i.e., leachate collection system, landfill gas collection system, Rail•Cycle's proposed liner system and the UZM system). However, if in spite of these safeguards migration were to occur, any contact with the ground water body would occur at the ground water table surface. This type of contact could result in a thin layer of detectable concentrations of volatile organic compounds (VOCs) at the top of the ground water body. The vertical spread of VOCs on this thin layer would be controlled by the speed at which the VOCs could disperse and diffuse within the aquifer.

Ground water velocities at the proposed site are very low, less than 0.5 feet/day. Vertical diffusion would be the dominant mechanism for vertical impact spreading at the site. Under conservative assumptions (including constant application of the landfill gas source over the entire downgradient migration path), preliminary calculations show that, in the absence of significant downward vertical gradients, the average time required for a single molecule of contamination to penetrate 5 feet into the aquifer below the proposed landfill by diffusion is about 200 years (Rust, 1993a).

3. Vertical downward ground water gradients are not expected to occur in the natural depositional environment of the alluvial fan underlying the proposed site. Ground water within the alluvial fan flows from coarser grained sediments located on the northern portion of the proposed landfill into finer grained sediments located on the southern portion of the landfill.

4. The presence of the Cargill wells creates unequal aquifer stresses that could result in localized downward hydraulic gradients. The wells are screened at a depth of about 270 feet and are about 300 feet in total depth. The production zones of these wells are interbedded coarser grained sands and silty sands and are separated from the water table by the interbedded, very fine grained silt clay and silts. For these wells to maintain downward hydraulic gradients at the water table, they must overcome the very low hydraulic conductivities of these silt/clay interbeds, as well as the hydraulic pressures caused by the southerly flow of regional ground water into the production zones.

5. Even if a significant vertical gradient is imposed across the entire water column, calculations show that only about three feet of downward movement would occur during the course of the north to south horizontal ground water migration beneath the proposed landfill (Rust, 1993a). If a leakage were to occur at the boundary of the landfill footprint (i.e., closest to the Cargill wells), a release would take over 10 years to travel the 750 feet to the project boundary (based on ground water movement of 70 feet per year in the downgradient portions of the landfill) (Rust, 1993b). During this period, even with the effect of potential vertical down gradients caused by Cargill pumping, the release could only travel 0.8 feet downward. Given the slow measured rates of ground water movement at the proposed site, mitigative actions to remediate any detected release could be undertaken long before significant downgradient contamination could occur.

6. In the event of a release from the landfill, the UZM system and downgradient monitoring wells would detect such a release at the earliest possible time. This detection would allow for the implementation of an appropriate corrective action program to prevent an impact to ground water downgradient from the landfill.

5.2.2 SUPPLEMENTAL MITIGATION MEASURES

5.2.2.1 Surface Water and Drainage

1. As required by CCR Title 23, Chapter 15, and Subtitle D, the proposed landfill would be protected from the 100-year flood. Engineered berms would be constructed on the perimeter of the landfill to protect the portions of Landfill Cell Nos. 11, 12, and 18 (per the refined landfill plan) from the 100-year floodplain.

2. Stormwater run-on and runoff control structures, including temporary and permanent diversion ditches, sedimentation and retention basins, will be designed, constructed and maintained for the 100-year, 24-hour storm.

5.2.2.2 Ground Water Quantity

1. Ground water pumping rates at the onsite well shall be limited to 1,400 gallons per minute for the duration of the initial construction period (approximately 90 days) and 100 gallons per minute on average, for the remaining duration of the active life of the landfill (60 to 100 years).

5.2.2.3 Ground Water Quality

1. Pursuant to Title 23 Chapter 15, a minimum separation of 5 feet between waste and the underlying ground water will be maintained. The separation will assume a uniform natural capillary rise of 9 feet throughout the site, will account for rises in the water table due to a 100-year storm and cessation of pumping from the Cargill wells, and will allow for a maximum settlement calculated using the conservative assumption that soils beneath the site are "normally consolidated."

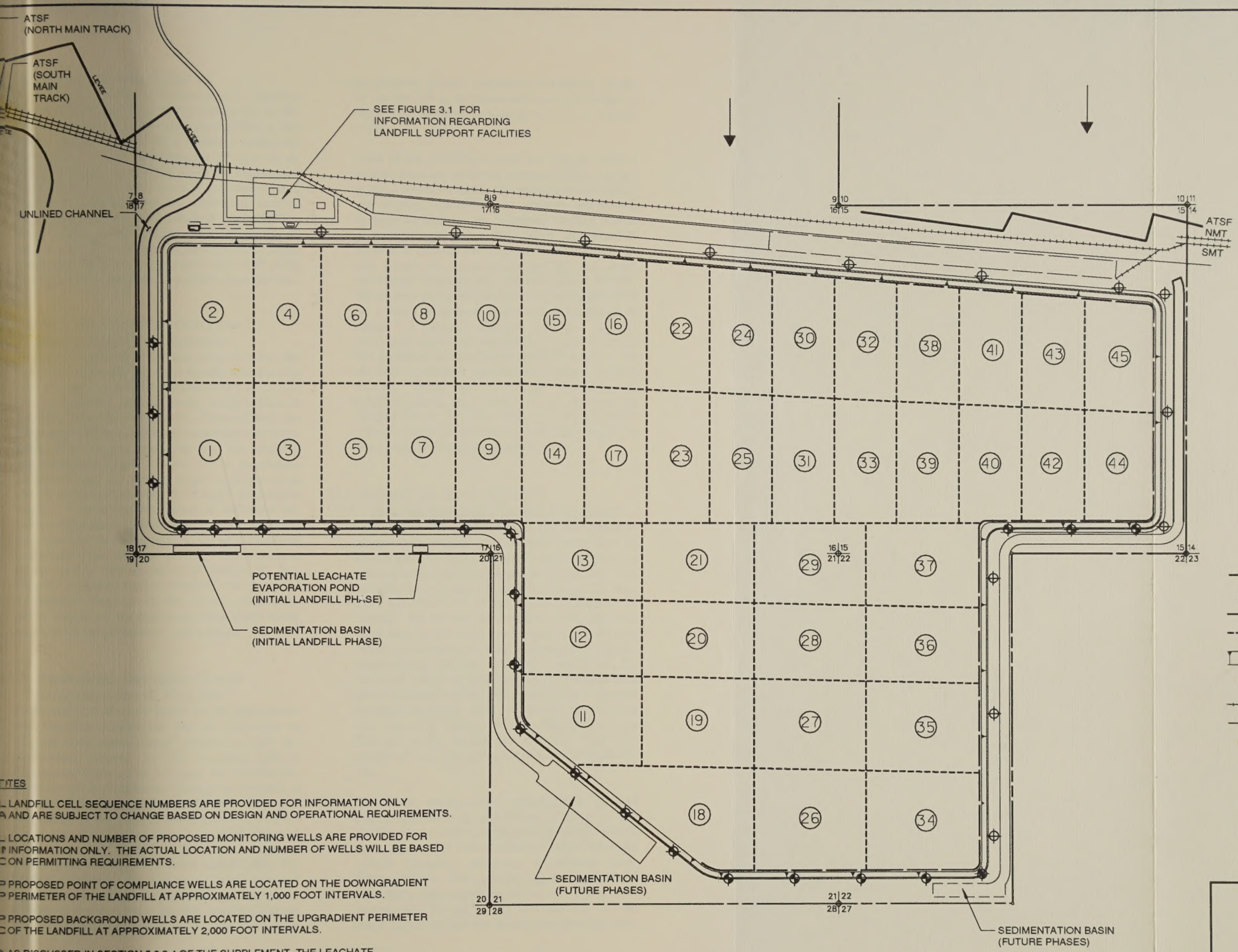
5.2.2.4 Ground Water Monitoring

1. As described in the Draft EIR/EIS, a ground water monitoring well system will be installed. The ground water Detection Monitoring Program will conform to CCR Title 23, Subtitle D, and the requirements of the RWQCB that assume the ground water mineral resource below the proposed landfill is of potable quality. No difference exists between the ground water monitoring program required at this facility, which is located over both potable and nonpotable water as defined by the SWRCB, and a facility that is located over an aquifer used for drinking water purposes.

2. Point of compliance monitoring wells would be spaced along the downgradient edges of the landfill footprint to provide a detection monitoring system in accordance with CCR Title 23, Subtitle D, and the requirements of the RWQCB. As shown in Figure 5.2.2, these poin compliance wells would be located near leachate collection sumps, the most prob point of leachate release. These poin compliance wells would constitute the gr water compliance point for the facility. Scre intervals and specific locations of these v would be determined at the time of installat in consultation with the RWQCB and ma in different locations than those show Figure 5.2.2.

3. As discussed in Section 3.2.4.2 of Supplement, if leachate evaporation ponds are at the site, they would be double li The leachate collection system between the liners would act as a monitoring syst Therefore, monitoring wells would not be requ downgradient from the leachate evapoara ponds.

4. The monitoring well system will be augmente the UZM system beneath the landfill line described in Chapter 3.0 of this Supplement. UZM system is being required by the RWQCB "mega-landfills" such as the proposed Bolo Sta Landfill.



LEGEND

- PROJECT AREA BOUNDARY
- SECTION CORNER (20 21 / 29 28)
- LIMIT OF WASTE FILL
- APPROXIMATE CELL BOUNDARY
- FILL SLOPE
- (2) LANDFILL CELL NUMBER
- ATCHISON, TOPEKA, AND SANTA FE RAILROAD
- GENERAL DIRECTION OF GROUND WATER FLOW
- PROPOSED POINT OF COMPLIANCE WELL
- PROPOSED BACKGROUND WELL

0 1,500 3,000 FEET
SCALE

NOTES

1. LANDFILL CELL SEQUENCE NUMBERS ARE PROVIDED FOR INFORMATION ONLY AND ARE SUBJECT TO CHANGE BASED ON DESIGN AND OPERATIONAL REQUIREMENTS.
2. LOCATIONS AND NUMBER OF PROPOSED MONITORING WELLS ARE PROVIDED FOR INFORMATION ONLY. THE ACTUAL LOCATION AND NUMBER OF WELLS WILL BE BASED ON PERMITTING REQUIREMENTS.
3. PROPOSED POINT OF COMPLIANCE WELLS ARE LOCATED ON THE DOWNGRADIENT PERIMETER OF THE LANDFILL AT APPROXIMATELY 1,000 FOOT INTERVALS.
4. PROPOSED BACKGROUND WELLS ARE LOCATED ON THE UPGRADIENT PERIMETER OF THE LANDFILL AT APPROXIMATELY 2,000 FOOT INTERVALS.
5. AS DISCUSSED IN SECTION 5.2.2.4 OF THE SUPPLEMENT, THE LEACHATE EVAPORATION PONDS WOULD NOT REQUIRE MONITORING WELLS AS THEY ARE DOUBLE LINED WITH A LEACHATE COLLECTION/MONITORING SYSTEM BETWEEN THE TWO LINERS.

REFERENCE: RUST, 1993C, DRAWING NO. 1.

FIGURE 5.2.2

PROPOSED GROUND WATER MONITORING WELLS

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

3 MINERAL RESOURCES

This section provides additional detail regarding the potential impact of the proposed action on the quality and quantity of brine production in the Bristol Basin. Verification analyses conducted subsequent to the distribution of the Draft EIR/EIS regarding ground water movement (as discussed in Sections 4.2 and 5.2) and brine-related issues are documented in numerous reports (Jacobs, 1992b, 1993a, 1993b; Rail Cycle, 1992c; Rust, 1993a, 199b, 1993c). The brine-related analyses in these studies focused on the Cargill production wells located approximately 400 yards downgradient of the boundary of the proposed site.

3.1 IMPACT ON BRINE PRODUCTION

3.1 Impact on Onsite Water Extraction

Anticipated ground water pumping to meet the requirements for the proposed landfill construction and operation is described in Section 5.2.1.2.1 of this Supplement. As discussed in that section, a modeling effort to simulate the effects of both the short-term (90-day construction period) and long-term (100 years) pumping on the aquifer was conducted (Rust, 1993a). The simulation indicated that the onsite water well pumping would not interfere with the Cargill production wells. The maximum radius of influence for wells on Section 9 (previously proposed location) was predicted to be between 5,000 and 7,000 feet at the end of the 100-year period. The relocation of the well to the southeast of Section 33 (see Figure 3.1) would further minimize the potential of negative impacts on the Cargill production wells which are located more than three miles south of the proposed new well location.

3.2 Impact of Soil Consolidation/Ground Settlement on Ground Water Flow

Settlement calculations based on the assumption that the soils beneath the site are "normally to slightly over-consolidated" determine that the drawdown created by the existing Cargill production wells could increase the overburden pressure of the sediments enough to produce a calculated maximum of up to 20 feet of ground settlement at the Cargill wells (Jacobs, 1993b). As discussed in Section 5.1.1.2.2, actual observed settlement at the Cargill wells is in the range of 2 feet over the past 20 years rather than the 20 feet calculated by Jacobs. Cargill has not reported any changes in its brine production as a result of the settlement that has occurred during the operational life of these wells. The increase in the amount of total, long-term settlement caused by the landfill is, therefore, not expected to have a significant impact on production from the Cargill wells.

2. Most of the production from the Cargill wells is derived from the relatively incompressible, coarser grained interbeds within the transition zone which are largely unaffected by ground settlement. Settlement due to the proposed landfill would primarily be limited to the clayey, compressible sediments beneath the proposed site. Based on in situ penetration test results and the maximum settlement calculations, the anticipated volume decrease of the underlying coarser grained materials as a result of ground settlement is estimated at about 0.1 percent (Jacobs, 1993b). If this maximum calculated settlement is applied across the sediments in the Cargill production zones, the average hydraulic conductivity values would change from an estimated 0.00400 to 0.00396 cm/sec as a result of the decrease in volume (Rust, 1993b). This level of hydraulic change would not produce a significant impact to the Cargill production capability.

5.3.2 IMPACT ON BRINE QUALITY

5.3.2.1 Potential Impacts to Chemical Composition

1. Water from the compaction of the pore space in clayey soils beneath the proposed landfill may be forced into the coarser grained, sandy intervals in which Cargill's production wells are screened. The introduction of water from the clayey soils may alter the chemistry of the water withdrawn by Cargill. An estimate of the ratio of silt/clay pore fluid that would enter the hydraulic system as a result of compaction was performed by Jacobs Engineering (Jacobs, 1993b). Based on the assumed sediment distribution (90 percent fine grained [compressible], 10 percent coarse grained [noncompressible]), their calculations showed that less than 0.01 percent of the total flow to the Cargill wells would be derived from the compression of fine-grained sediments beneath the site.

2. Based on conservative calculations, it was determined that no significant change to the quality of the water withdrawn by Cargill would occur due to the consolidation of clay materials within Cargill's pumping drawdown cone (Rust, 1993a). For example, assuming that the pore space water entering the aquifer had a TDS content of 100 mg/L, the introduction of the water would change the brine concentration from

30,000 mg/L to 29,997 mg/L. These results are conservative as they assume:

- Instantaneous release of pore space water, when in actuality the drainage would occur slowly over a considerable time period.
- An unrealistically low TDS concentration of the pore space water.
- A silt/clay sediment distribution of 90 percent of the soil column.

5.3.2.2 Potential Gas and Leachate Migration and Impact on Brine Quality

1. Section 5.2.1.2.2 of this Supplement evaluates the potential for a gas or leachate release and the anticipated movement of any such release. The information from that section is summarized here in the context of potential contamination to the Cargill brine resources.

2. As described in Section 3.0 of this Supplement, the proposed double liner system and dual leachate collection system would provide redundancy to assure that any leachate released would be collected. If, however, there was a failure in these systems and a release did occur, the Unsaturated Zone Monitoring (UZM) system would provide coverage of the unsaturated (vadose) zone beneath each module to assure early and sensitive leak detection. UZM gas sampling withdrawal pipes underlying the liner near the central leachate collection lines would operate continuously to provide "real time" monitoring of each landfill cell.

3. Section 5.2.1.2.2 of this Supplement discusses the potential migration of gas and/or leachate based on ground water movement and velocities at the proposed site. As noted, ground water velocities at the site are less than 0.5 feet/day. Taking into account the vertical gradient of ground water flow beneath the site, calculations show that even if a release were to occur at the boundary of the landfill footprint (i.e., closest to the Cargill wells), such a release would take over 10 years to travel the 750 feet to the project boundary. Even with the effect of an increased vertical gradient caused by Cargill pumping, the release could only travel 0.8 feet downward (Rust, 1993a).

4. Requirements of Subtitle D and CCR Title 23 include corrective action to prevent movement beyond the boundary of the landfill in the event of a release to ground water. Given the slow measured rates of ground water movement and limited vertical gradient at the proposed site, adequate time (in excess of several years) allow the implementation of mitigative acti remediate any detected release before sign downgradient movement could occur. Con releases could be through the installati addition of liquid and/or gas extraction wells.

5. Construction of a grout curtain or cutoff downgradient of the release could also be u isolate the release to prevent contaminati offsite ground water. The grout curtain limit the size of the contaminated area by ke the release onsite, and substantially reduc amount of ground water requiring pumpin treatment. In the event a grout curtain installed to control a release from the landfill, a curtain would extend only far enough belo top of the ground water table to contai release. As discussed above, the limited gr water vertical gradient beneath the site would it unnecessary for the grout curtain to e beyond a nominal depth; therefore, a grout c would only negligibly affect flow withir aquifer and would not impact production fro Cargill wells.

5.3.3 SUPPLEMENTAL MITIGATION MEASU

1. No supplemental measures are required to mit potential impacts to brine resources. Lar design features; the double liner system, leachate collection system, and UZM sys would minimize the potential for any leacha gas release from the waste body and would pro early, sensitive detection in the event of any release. Ground water monitoring mitiga as detailed under Section 5.2.2.4 of this Sup ment, would augment the UZM monitorin assure detection of any release. As outline the Draft EIR/EIS, corrective ac (i.e., installation of liquid and/or gas extrac wells, or a grout curtain or cutoff wall) for exceedance of water quality standards, as requ by CCR Title 23, Chapter 15, Article 5, woul implemented in consultation with the LEA RWQCB.

2. As required by CCR Title 23, Chapter Article 5 and Subtitle D, Rail•Cycle establish a financial assurance mechanism to c the potential cost for corrective action for "reasonably foreseeable release." Such a finan assurance program would include poten corrective action for a release that would im the mineral resource value of the ground water.

4 AIR QUALITY

As discussed in Section 4.4, comments to the Draft EIR/EIS requested refinement and reevaluation of analyses performed to address the following topics:

- Vehicle idling emissions at rail crossings.
- No Action Alternative.

As a result of the above analyses, and in response to other comments on the Draft EIR/EIS, revision and clarification of mitigation measures has also been conducted.

The following sections discuss the issues associated with the potential impacts for vehicle idling emissions at rail crossings and the No Action Alternative. Revised and clarified mitigation measures are also included.

4.1 VEHICLE IDLING EMISSIONS AT RAIL CROSSINGS

Air contaminant emissions associated with motor vehicle idling were estimated for both the 3,000 tons per day and 21,000 tons per day Bolo Station Landfill disposal scenarios. Emissions were totaled separately for the South Coast Air Basin (SCAB) and Southeast Desert Air Basin (SEDAB). The 3,000 tons per day disposal year was assumed to be 1994, and the 21,000 tons per day disposal year was assumed to be 1998.

Data presented in Appendix E of this document detail the calculation of vehicle delay time per train for each rail crossing between the proposed Bolo Station Landfill and the general areas in which MRFs may be located. For the purposes of this analysis, it has been assumed that MRFs may be operated at the following locations:

- City of Commerce.
- One potential location on the rail segment between San Bernardino and the City of Commerce (i.e., perhaps at the Puente Hills Landfill).
- San Bernardino.
- Two potential locations on the rail segment between San Bernardino and Irwindale (also known as the Pasadena Subdivision).
- Santa Clarita.
- Victorville.

Only the Commerce MRF has been sited and approved, and will be the only MRF assumed to operate during the 3,000 tons per day scenario. The Puente Hills MRF has been described in the EIR prepared for the Puente Hills Landfill (Los Angeles County, 1992). Actual locations of the other MRFs will be determined as the need arises. Subsequent MRFs will be subject to site-specific permitting, including CEQA analysis.

3. The results of vehicle delay time calculations are summarized in Table 5.4.1. Table 5.4.1 also shows the expected number of one-way train trips for each rail segment evaluated, and calculates total vehicle delay times.

4. Table 5.4.2 summarizes estimated air contaminant emissions associated with vehicles idling at rail crossings for the time periods reported in Table 5.4.1. The calculated emissions were compared with emission significance thresholds for the SCAB and SEDAB (a portion of the SEDAB is under SCAQMD jurisdiction) published in SCAQMD's April 1993 CEQA Air Quality Handbook to determine whether they represent a significant adverse impact (MDAQMD does not presently have a similar guidance document).

5. As noted in Table 5.4.2, upon comparison with SCAQMD emission significance thresholds, the increased vehicle idling emissions associated with the proposed action are not significant. The cumulative significance of air contaminant emissions associated with transport of solid waste by rail to the proposed Bolo Station Landfill, versus the No Action Alternative is evaluated below.

5.4.2 NO ACTION ALTERNATIVE

1. As noted in Section 2.0, by the year 2004 Los Angeles County is expected to have a shortfall of approximately 16,800 tons per day of landfill capacity. An additional 6,000 tons per day shortfall is expected in San Bernardino and Riverside Counties, for a total 22,800 tons per day shortfall in the SCAB. If the Proposed Action is not implemented, a variety of options exist for dealing with the shortfall. For the purposes of this analysis, the primary difference between the waste disposal options considered in this analysis is mode of transportation. Therefore, this analysis focuses upon the potential air quality impacts associated with transportation emission sources (i.e., packer trucks, transfer trucks, and trains).

2. Potential air quality impacts for the No Action Alternative depend upon the following:
   - Feasibility of siting new landfills in Los Angeles County.
   - Feasibility of expanding the capacity of existing landfills in Los Angeles County.

TABLE 5.4.1

VEHICLE DELAY TIMES AT RAIL CROSSINGS
PROPOSED ACTION

AIR BASIN	RAIL SEGMENT	VEHICLE DELAY TIME PER TRAIN (minutes)		NUMBER OF RAIL•CYCLE TRAINS		TOTAL VEHICLE DELAY TIME (minutes)	
		3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd
SEDAB	Bolo Station to Barstow	22.6	27.4	2	14	45.2	383.6
	Barstow to Victorville	59.5	72.5	2	12	119.0	870.0
	Barstow to San Bernardino/Kern County Line	101.0	123.2	0	2	0.0	246.4
	Mojave District, Begin Saugus Line Road Crossings	70.5	85.6	0	2	0.0	171.2
	Mojave District, Begin Bakersfield Line Road Crossings	315.5	385.6	0	2	0.0	771.2
	Total	569.1	694.3	NA	NA	164.2	2,442.4
SCAB	Victorville to San Bernardino	45.0	54.9	2	10	90.0	549.0
	San Bernardino to San Bernardino/Riverside County Line	251.4	307.9	2	4	502.8	1,231.6
	West Riverside County Line, Begin Orange County	1,273.5	1,874.9	2	4	2,547.0	7,499.6
	West Orange County Line, Begin Los Angeles County	500.2	622.4	2	4	1,000.4	2,489.6
	San Bernardino to San Bernardino/Los Angeles County Line (Pasadena Subdivision)	2,167.2	2,996.0	0	4	0.0	11,984.0
	San Bernardino/Los Angeles County Line, Working West	1,017.4	1,251.0	0	4	0.0	5,004.0
	Riverside County Line, Working West	827.4	1,015.0	0	4	0.0	4,060.0
	Total	6,082.1	8,122.1	NA	NA	4,140.2	32,817.8

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EMISSIONS FROM VEHICLE DELAYS AT RAIL CROSSINGS
PROPOSED ACTION

POLLUTANT	EMISSION FACTORS (grams/min)	
	3,000 tpd	21,000 tpd
NOx	0.18	0.16
ROG	0.25	0.18
CO	2.70	1.72

AIR BASIN	SCENARIO (tons per day)	VEHICLE DELAY (min)	EMISSIONS (pounds/day)		
			NOx	ROG	CO
SEDAB	3,000	164.2	0.07	0.09	0.98
	21,000	2,442.4	0.86	0.97	9.25
SCAB	3,000	4,140.2	1.64	2.28	24.62
	21,000	32,817.8	11.57	13.01	124.33
Total	3,000	4,304.4	1.71	2.37	25.60
	21,000	35,260.2	12.43	13.98	133.58
SCAQMD Significance Thresholds			55	55	550
Significant Impact?			No	No	No

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Note: Vehicle idling emission factors taken from CARB's EMFAC7PC mobile source emission factor program. The 3,000 tpd factors correspond to 1990 conditions; 21,000 tpd factors correspond to 1995 conditions.

- Distance over which solid waste must be transported from MRF (or curbside) to landfill.
- The amount of solid waste that will be carried to landfills in: (1) packer trucks; (2) transfer trucks; and/or (3) trains.
- Cost competition between the various waste disposal and transportation options available to meet the projected shortfall.

3. The above issues are interrelated and various combinations are possible. For the purposes of this analysis, the following assumptions are made:
   - At least one new landfill (e.g., Elsmere Canyon) may be developed in Los Angeles County. This would reduce, but not eliminate the projected 22,800 tons per day shortfall in landfill capacity.
   - Permitted capacity and disposal rate may be expanded for several existing landfill sites in Los Angeles County (i.e., Puente Hills, BKK, and Sunshine Canyon). This would reduce, but not eliminate the projected 22,800 tons per day shortfall in landfill capacity.
   - None of the major rail-oriented regional landfills proposed for development in southern California (Bolo Station, Eagle Mountain, and Mesquite Regional Landfill) have yet been permitted. However, two landfills outside California (WMNA's Franconia Landfill in Mohave County, Arizona, and East Carbon Canyon in Utah) are potentially capable of receiving solid waste by rail.
   - Two MRFs in the Los Angeles area (City of Commerce and Puente Hills) have been permitted to transport solid waste by rail. In addition, several other MRFs are in various stages of planning which have been sited with easy access to rail service (i.e., Fontana, Irwindale, and Vernon).
   - Utilization of in-basin landfills, regional landfills, and landfills outside of California will be based on availability of MRFs, in-basin landfill capacity, and cost competition between the various disposal options.

4. To accommodate the projected 22,800 tons per day shortfall in the SCAB, it is likely that a mix of in-basin landfills, regional landfills, and landfills outside of California will be used. Given the highly competitive nature of the waste disposal market, it is not possible to definitively estimate the actual mix of solid waste disposal/transport options used to offset the 22,800 tons pe shortfall. Therefore, this evaluation assume two trains per day each carrying 3,000 to solid waste (a total of 6,000 tons per day) m operated in connection with other waste dis and transport measures even if the proposed Station Landfill does not become operational.

5. Solid waste transported by rail could potentia accepted at WMNA's Franconia Landfi Mohave County, Arizona, and/or East Ca Canyon Landfill in Utah. Trains bound fo Franconia Landfill would travel via the ATS line that parallels Interstate 40, while trains b for the East Carbon Canyon Landfill would t via ATSF rail lines to east of Barstow, and by the Union Pacific Railway rail line parallels Interstate 15. The total distance tra by trains along both routes from Barstow t California border is equivalent (within ten m Therefore, transportation related air contam emissions would be equivalent, and emiss along both routes would occur in the sam basin (i.e., SEDAB).

6. While the shortfall in landfill capacity in S is projected to be 22,800 tons per day, No Action Alternative emissions are comp against emissions for the 3,000 tons per day 21,000 tons per day Bolo Station Lan disposal scenarios. Emissions were tot separately for the SCAB and SEDAB. 3,000 tons per day disposal year was assume be 1994, and the 21,000 tons per day disposal was assumed to be 1998. Analyses included following air contaminant emission so categories:
   - **Locomotive Emissions:** Each train assumed to carry 3,000 tons of solid was per trip. For the No Action Alternative, trains are assumed to transport a total of 3,000 tons of waste per day to landfills outside of California (potentially WMNA Franconia Landfill in Mohave County, Arizona, or East Carbon Canyon Landfill in Utah) during the 3,000 tons per day disposal year, and 6,000 tons per day duri the 21,000 tons per day disposal year. Remaining waste, ranging from 18,000 t per day in 1994 to 15,000 tons per day in 1998, would be transported to landfills in Los Angeles County by a combination of packer and transfer trucks. In comparison the No Action Alternative, the Proposed Action would transport all solid waste by trains for both the 3,000 and 21,000 tons per day disposal years. Locomotive emissions for the Proposed Action assum

transport of waste to the Bolo Station site, while No Action Alternative emissions are based on transport of waste to the California state line. Emissions associated with Rail•Cycle trains were based on data presented in the Draft EIR/EIS, and on current CARB plans to achieve emission reductions from locomotives in nonattainment air basins (CARB, 1992). For 1994, no emission reductions are projected. By 1998, the following emission reductions are projected:

- NO_X: 40 percent
- PM_{10}: 10 percent
- Sulfur oxide (SO_X): 84 percent
- ROG: 0 percent

9-ton Packer Trucks: Packer trucks were assumed to carry 8.73 tons of solid waste per load, and a total 4,500 tons per day during the 21,000 tons per day disposal year. This estimate is based on the assumption that additional transfer stations will be operational in SCAB so that only 30 percent of solid waste destined for local landfills would be transported by packer trucks. All solid waste is assumed to be transported by rail during the 3,000 tons per day disposal year. Calculations were based on emission factors obtained from CARB's EMFAC7EP mobile source emission factor computer program, assuming an average vehicle speed of 35 mph.

22-ton Transfer Trucks: Transfer trucks were assumed to carry 20 tons of solid waste per load, and a total of 10,500 tons per day during the 21,000 tons per day disposal year. This estimate is based on the assumption that additional transfer stations will be operational in SCAB and that approximately 70 percent of solid waste destined for local landfills would be transported by transfer trucks. All solid waste is assumed to be transported by rail during the 3,000 tons per day disposal year. Calculations were based on emission factors obtained from CARB's EMFAC7EP mobile source emission factor computer program, assuming an average vehicle speed of 35 mph.

Vehicles Idling at Rail Crossings: The passage of Rail•Cycle trains from MRF to landfill will result in the delay of motor vehicles at rail crossings along the entire route. The computation of these emissions from vehicle idling is detailed, for the proposed action, in Section 5.4.1 of this document. Estimation of vehicle idling emissions for the No Action Alternative are summarized in Tables 5.4.3 and 5.4.4.

7. The results of these analyses are summarized in Table 5.4.5, for the 3,000 tons per day scenario, and Table 5.4.6, for the 21,000 tons per day scenario. Detailed calculations are included in Appendix E. As shown in the tables, SCAB emissions of the calculated criteria pollutants for the 3,000 tons per day scenario are identical for the Proposed Action and No Action Alternative. Emissions of the calculated criteria pollutants decrease in the SCAB as a result of Rail•Cycle for the 21,000 tons per day scenario resulting in a benefit to air quality in the SCAB.

8. In the SEDAB, emissions of the calculated criteria pollutants decrease as a result of Rail•Cycle for the 3,000 tons per day scenario resulting in a benefit to air quality in the SEDAB. SEDAB emissions of the calculated criteria pollutants increase for the 21,000 tons per day scenario. The calculated emissions increases were compared with emission significance thresholds for the SCAB and SEDAB (a portion of the SEDAB is under SCAQMD jurisdiction) published in SCAQMD's April 1993 CEQA Air Quality Handbook to determine whether they represent a significant adverse impact (MDAQMD does not presently have a similar guidance document).

9. As noted in Tables 5.4.5 and 5.4.6, upon comparison with SCAQMD emission significance thresholds, emission increases of NO_X and ROG associated with the 21,000 tons per day scenario in the SEDAB are considered to be significant. The remaining air contaminant emissions increases (i.e., SO_X, CO, and TSP) noted between the Proposed Action and No Action Alternative are below the respective emission significance thresholds.

5.4.3 SUPPLEMENTAL MITIGATION MEASURES

1. This section has been prepared in response to comments on the Draft EIR/EIS requesting additional and revised measures to mitigate the significant air quality impacts associated with transport of solid waste by rail and operation of the proposed Bolo Station Landfill.

2. In May 1993, Rail•Cycle submitted a document entitled *Rail•Cycle Bolo Station Landfill Supplemental Air Quality Analysis* (Rail•Cycle, 1993). In preparation of this document, an

TABLE 5.4.3

VEHICLE DELAY TIMES AT RAIL CROSSINGS
NO ACTION ALTERNATIVE

AIR BASIN	RAIL SEGMENT	VEHICLE DELAY TIME PER TRAIN (minutes)		NUMBER OF RAIL•CYCLE TRAINS		TOTAL VEHICLE DELAY TIME (minutes)	
		3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd	3,000 tpd	21,000 tpd
SEDAB	Bolo Station to Barstow	22.6	27.4	2	4	45.2	109.6
	Barstow to Victorville	59.5	72.5	2	4	119.0	290.0
	Barstow to San Bernardino/Kern County Line	101.0	123.2	0	0	0.0	0.0
	Mojave District, Begin Saugus Line Road Crossings	70.5	85.6	0	0	0.0	0.0
	Mojave District, Begin Bakersfield Line Road Crossings	315.5	385.6	0	0	0.0	0.0
	Total	569.1	694.3	NA	NA	164.2	399.6
SCAB	Victorville to San Bernardino	45.0	54.9	2	4	90.0	219.6
	San Bernardino to San Bernardino/Riverside County Line	251.4	307.9	2	4	502.8	1,231.6
	West Riverside County Line, Begin Orange County	1,273.5	1,874.9	2	4	2,547.0	7,499.6
	West Orange County Line, Begin Los Angeles County	500.2	622.4	2	4	1,000.4	2,489.6
	San Bernardino to San Bernardino/Los Angeles County Line (Pasadena Subdivision)	2,167.2	2,996.0	0	0	0.0	0.0
	San Bernardino/Los Angeles County Line, Working West	1,017.4	1,251.0	0	0	0.0	0.0
	Riverside County Line, Working West	827.4	1,015.0	0	0	0.0	0.0
	Total	6,082.1	8,122.1	NA	NA	4,140.2	11,440.4

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EMISSIONS FROM VEHICLE DELAYS AT RAIL CROSSINGS
NO ACTION ALTERNATIVE

POLLUTANT	EMISSION FACTORS (grams/min)	
	3,000 tpd	21,000 tpd
NOx	0.18	0.16
ROG	0.25	0.18
CO	2.70	1.72

AIR BASIN	SCENARIO (tons per day)	VEHICLE DELAY (min)	EMISSIONS (pounds/day)		
			NOx	ROG	CO
SEDAB	3,000	164.2	0.07	0.09	0.98
	21,000	399.6	0.14	0.16	1.51
SCAB	3,000	4,140.2	1.64	2.28	24.62
	21,000	11,440.4	4.03	4.54	43.34
Total	3,000	4,304.4	1.71	2.37	25.60
	21,000	11,840.0	4.17	4.69	44.86
SCAQMD Significance Thresholds			55	55	550
Significant Impact?			No	No	No

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Note: Vehicle idling emission factors taken from CARB's EMFAC7PC mobile source emission factor program. The 3,000 tpd factors correspond to 1990 conditions; 21,000 tpd factors correspond to 1995 conditions.

TABLE 5.4.5

COMPARISON OF 3,000 TONS PER DAY AND NO ACTION ALTERNATIVE EMISSIONS CUMULATIVE IMPACTS

SCENARIO	EMISSION SOURCE	WORST DAY EMISSION (lbs/day)					ANNUAL EMISSION (tons/yr)				
		ROG	NOx	SO_2	CO	TSP	ROG	NOx	SO_2	CO	TSP
SCAB EMISSIONS	Proposed Action:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	2.28	1.64	0.00	24.62	0.00	0.35	0.25	0.00	3.75	0.00
	• Locomotives	32.36	910.84	65.16	111.56	19.24	5.05	142.09	10.16	17.40	3.00
	• Adjustments (Locomotive Controls)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total (SCAB - Project Emissions)	34.64	912.48	65.16	136.18	19.24	5.40	142.34	10.16	21.15	3.00
	No Action Alternative:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	2.28	1.64	0.00	24.62	0.00	0.35	0.25	0.00	3.75	0.00
	• Locomotives	32.36	910.84	65.16	111.56	19.24	5.05	142.09	10.16	17.40	3.00
	• Adjustments (Locomotive Controls)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total (SCAB - No-Project Emissions)	34.64	912.48	65.16	136.18	19.24	5.40	142.34	10.16	21.15	3.00
	Net Emissions Increase (SCAB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SCAQMD Significance Thresholds	55	55	150	550	150	NA	NA	NA	NA	NA
	Significant Impact?	No	No	No	No	No	NA	NA	NA	NA	NA
SEDAB EMISSIONS	Proposed Action:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	0.09	0.07	0.00	0.98	0.00	0.01	0.01	0.00	0.15	0.00
	• Locomotives	36.93	931.37	66.32	125.58	20.08	5.76	145.29	10.35	19.59	3.13
	• Adjustments (Locomotive Controls)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total (SEDAB - Project Emissions)	37.02	931.44	66.32	126.56	20.08	5.77	145.30	10.35	19.74	3.13
	No Action Alternative:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	0.09	0.07	0.00	0.98	0.00	0.01	0.01	0.00	0.15	0.00
	• Locomotives	36.93	931.37	66.32	125.58	20.08	5.76	145.29	10.35	19.59	3.13
	• Adjustments (Locomotive Controls)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total (SEDAB - No-Project Emissions)	37.02	931.44	66.32	126.56	20.08	5.77	145.30	10.35	19.74	3.13
	Net Emissions Increase (SEDBA)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SCAQMD Significance Thresholds	55	55	150	550	150	NA	NA	NA	NA	NA
	Significant Impact?	No	No	No	No	No	NA	NA	NA	NA	NA

COMPARISON OF 21,000 TONS PER DAY AND NO ACTION ALTERNATIVE EMISSIONS
CUMULATIVE IMPACTS

SCENARIO	EMISSION SOURCE	WORST DAY EMISSION (lbs/day)					ANNUAL EMISSION (tons/yr)				
		ROG	NOx	SO_2	CO	TSP	ROG	NOx	SO_2	CO	TSP
SCAB EMISSIONS	Proposed Action:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	13.01	11.57	0.00	124.33	0.00	1.98	1.76	0.00	18.96	0.00
	• Locomotives	161.80	4,554.20	325.80	557.80	96.20	25.25	710.45	50.80	87.00	15.00
	• Adjustments (Locomotive Controls)	0.00	(1,821.68)	(273.67)	0.00	(9.62)	0.00	(284.18)	(42.67)	0.00	(1.50)
	Total (SCAB - Project Emissions)	174.81	2,744.09	52.13	682.13	86.58	27.23	428.03	8.13	105.96	13.50
	No Action Alternative:										
	• 9-Ton Packer Trucks	106.99	550.30	16.38	393.65	120.81	16.69	85.85	2.56	61.41	18.85
	• Transfer Trucks	218.12	1,121.92	33.40	802.57	246.30	34.03	175.02	5.21	125.20	38.42
	• Vehicles Idling at Rail Crossings	4.54	4.03	0.00	43.34	0.00	0.69	0.61	0.00	6.61	0.00
	• Locomotives	64.72	1,821.68	130.32	223.12	38.48	10.10	284.18	20.32	34.80	6.00
	• Adjustments (Locomotive Controls)	0.00	(728.67)	(109.47)	0.00	(3.85)	0.00	(113.67)	(17.07)	0.00	(0.60)
	Total (SCAB - No-Project Emissions)	394.37	2,769.26	70.63	1,462.68	401.74	61.51	431.99	11.02	228.02	62.67
	Net Emissions Increase (SCAB)	(219.56)	(25.18)	(18.50)	(780.55)	(315.16)	(34.27)	(3.96)	(2.89)	(122.06)	(49.17)
	SCAQMD Significance Thresholds	55	55	150	550	150	NA	NA	NA	NA	NA
	Significant Impact?	No	No	No	No	No	NA	NA	NA	NA	NA
SEDAB EMISSIONS	Proposed Action:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	0.97	0.86	0.00	9.25	0.00	0.15	0.13	0.00	1.41	0.00
	• Locomotives	258.51	6,519.59	464.24	879.06	140.56	40.32	1,017.03	72.45	137.13	21.91
	• Adjustments (Locomotive Controls)	0.00	(2,607.84)	(389.96)	0.00	(14.06)	0.00	(406.81)	(60.86)	0.00	(2.19)
	Total (SEDAB - Project Emissions)	259.48	3,912.61	74.28	888.31	126.50	40.47	610.35	11.59	138.54	19.72
	No Action Alternative:										
	• 9-Ton Packer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Transfer Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	• Vehicles Idling at Rail Crossings	0.16	0.14	0.00	1.51	0.00	0.02	0.02	0.00	0.23	0.00
	• Locomotives	73.86	1,862.74	132.64	251.16	40.16	11.52	290.58	20.70	39.18	6.26
	• Adjustments (Locomotive Controls)	0.00	(745.10)	(111.42)	0.00	(4.02)	0.00	(116.23)	(17.39)	0.00	(0.63)
	Total (SEDAB - No-Project Emissions)	74.02	1,117.78	21.22	252.67	36.14	11.54	174.37	3.31	39.41	5.63
	Net Emissions Increase (SCAB)	185.46	2,794.83	53.06	635.64	90.36	28.92	435.98	8.28	99.13	14.09
	SCAQMD Significance Thresholds	55	55	150	550	150	NA	NA	NA	NA	NA
	Significant Impact?	Yes	Yes	No	Yes	No	NA	NA	NA	NA	NA

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analysis of the following air quality emissions and mitigation measures was conducted:

- A review of the baseline emissions (i.e., those reported in the Draft EIR/EIS) was conducted and revisions made to several areas where updated information is available that makes a significant change in the estimated project emissions. Baseline emissions associated with the project are estimated to be substantially lower than those reported in the Draft EIR/EIS. The reductions in emissions are primarily the result of NO_x emission controls on locomotives, as forecast by CARB.
- Mitigation measures in addition to those described in the Draft EIR/EIS were identified and analyzed in relation to effectiveness, feasibility, and cost-effectiveness.
- Additional mitigation measures determined to be feasible and cost-effective.
- Given the revised baseline and proposed mitigation program, impacts of the project on air quality attainment plans were evaluated and discussed.

5.4.3.1 Onsite Mitigation Measures

5.4.3.1.1 Trucks, Heavy Duty Equipment, Landfill Gas, and Fugitive Dust

1. Based on the analysis of onsite air emission sources, the following additional mitigation measures have been included in this Supplement:

   - Use of engines in heavy duty diesel trucks meeting advanced emission standards for highway vehicles.
   - Early replacement of landfill operating equipment when new equipment meeting lower standards becomes available.

   These two measures will eliminate from 27 to 44 tons per year of NO_x from the projected site inventory for the period 1997-2010. Rail•Cycle will submit an annual and biannual status reports on potential emission reductions from landfill gas, to enable the MDAQMD to monitor the potential for additional mitigation of these sources.

2. Fugitive dust emissions from unpaved roads used at the proposed landfill to haul containers from the railyard/offloading facility to the active working face will be further mitigated by paving roads projected to be in use for extended periods of time (e.g., five to ten years). The criteria for selection of which roads to pave will be developed on the basis of consultation with the MDAQMD.

5.4.3.1.2 Management of Collected Leachate and Condensate

1. Potential emissions of VOCs from lea evaporation ponds or the reintroducti collected leachate and condensate into the w the active working face of the landfill evaluated in the report *Bolo Station Lan Estimate of Leachate and Condensate L Volumes and Volatile Organic Emissions fr Evaporation Pond* (Rail•Cycle, 1992). analyses conducted for this report, VOC emi from leachate evaporation ponds or reintroduction of leachate at the working fa considered to be similar at an estimated 4. per year after 50 years of landfill oper Approximately 98 percent of the VOC emi are from the condensate.

2. Although emissions from the evapor reintroduction constitute only a 1 percent inc in the 560 tons per year of VOC emissions other sources associated with the proposed la the SEDAB is not in attainment of ambie quality standards for ozone. VOC emissions leachate and condensate evaporation/reintrodu and other landfill sources represent a subst contribution to existing violations of the c standard in the region. As stated in Section the Draft EIR/EIS, this constitutes a signi impact.

3. A mitigation measure has been included i Supplement requiring Rail•Cycle to eva leachate and condensate treatment sys currently in use or proposed for use at landfills for implementation at the proposed Station. One technology which shoul evaluated is routing of leachate and condens an air stripper. Gases exhausted from th stripper are fed to the landfill gas flare for the oxidation of VOCs. Liquid effluent from th stripper could be disposed offsite or, base analysis of constituents and regula concurrence, disposed onsite by one of following methods:

   - Evaporation.
   - Application on haul roads or the a working face for dust control purposes.
   - Reintroduction into the waste prism.

4. Leachate control systems, such as the air stri are capable of achieving between 90 to 99 pe reduction in VOC emissions. As n previously, approximately 98 percent of lea and condensate emissions are associated condensate production, which is not expected generated in large quantities until approxim three to five years after the landfill has b

cepting solid waste. Since properties of leachate d condensate may vary considerably between ndfills it is recommended that during this initial riod, a comprehensive evaluation be conducted characterize leachate and condensate produced by e proposed landfill, and determine the most propriate means of managing leachate and ndensate, and controlling VOC emissions. epending on the results of this evaluation, and in nsultation with the LEA, CIWMB, MDAQMD, d County Planning Department, a specific ethod to control VOCs from the evaporation/ introduction of leachate and condensate will be plemented at the proposed landfill.

.3 Offsite Mitigation Measures

ffsite mitigation identified as probable nsequences of project development are reduced missions from electrical generating plants in the gion, as a result of the landfill gas energy covery facilities planned by Rail•Cycle; and iscontinued operations at landfills that can be losed if the project is implemented as proposed. hese offsetting mitigation events will reduce roject impacts by about 60 tons per year of NO_x nd 4 tons per year of ROG.

n addition to the above, the following ansportation control measures have been included s mitigation measures in this Supplement:

Contribution to funding of public transportation or ride sharing systems for local communities in the SEDAB.

Contribution to funding of a program to retire older, high pollution vehicles in the SEDAB.

ased on further evaluation and consultation with he MDAQMD and other local agencies, ppropriate transportation control measures would e adopted to further mitigate NOx emissions in he SEDAB resulting from Rail•Cycle project perations. It is not certain at this time whether it vould be feasible to mitigate emissions below the ignificance thresholds adopted in this section.

As requested in several comments on the Draft EIR/EIS, the feasibility of rail electrification was valuated. The findings of this evaluation indicate hat rail electrification solely to mitigate Rail•Cycle's air quality impacts is not feasible on he basis of cost and practicality. This is consistent with CARB's 1991 finding that electrification of the Los Angeles Basin rail system should cost over one billion dollars (CARB, 1991). Because of the high initial costs associated with rail line electrification, CARB reports that privately financed railroads do not consider converting their lines as economically feasible. CARB's analysis indicates that new sources of funding would be required to support a major electrification retrofit effort.

5.4.3.3 Significance After Mitigation

1. Impacts on attainment of emission goals for SEDAB are reduced, but not eliminated by the revised baseline emissions estimate and the combined mitigation measures of the Draft EIR/EIS and this Supplement proposed for implementation. The current MDAQMD projections for attainment of the mandated 30 percent reduction in emissions from the 1987 baseline will not be materially changed with respect to NO_x. Rail•Cycle emissions of ROG will have a more noticeable adverse impact on attainment of the 30 percent reduction, primarily because MDAQMD planning estimates demonstrate that control activities currently contemplated will barely achieve the goal for a few years before emissions trend above the goal again.

2. The conclusions discussed in Section 5.4.2 (No Action Alternative) differ with Section 5.7 of the Draft EIR/EIS, which stated that the Rail•Cycle project would result in a regional "net air quality benefit" when compared to a future baseline without the Rail•Cycle project. As a result of the analyses documented in this section, this finding is revised to indicate that the Rail•Cycle project would result in significant unavoidable adverse NOx emissions increases in the SEDAB.

3. The following summarizes revised air quality impact estimates for the proposed action:

CATEGORY	NO_x	ROG	TOTAL
Project Emissions in 2010 (tons/day)	1.2	0.5	1.7
Revised Air Quality Attainment Plans (AQAP) Estimate of Reduction Required in 2010 (tons/day)	116.8	14.7	131.5
Project Emissions as Percentage of Required Reduction	1.0 %	3.4 %	1.3 %

5.5 NOISE

5.5.1 RAILROAD CORRIDOR

1. Potential rail noise impacts were estimated for both the 3,000 tons per day and 21,000 tons per day disposal scenarios. Impacts were estimated for Rail•Cycle and the No Action Alternative. The 3,000 tons per day disposal year was assumed to be 1994, and the 21,000 tons per day disposal year was assumed to be 1998.

2. The scale used for evaluation of noise impacts in this analysis is the Community Noise Equivalent Level (CNEL). The CNEL is widely used in California and applied by federal agencies, and represents an average of measured noise levels obtained over a specified period of time. The CNEL scale represents a time weighted 24-hour average noise level based on the A-weighted decibel (dBA). Time weighted refers to the fact that noise occurring during certain sensitive time periods is weighted for occurring at these times. That is, the late evening and early morning hours (between 10:00 p.m. and 7:00 a.m.) receive a 10 dBA weighting. Evening hours (between 7:00 p.m. and 10:00 p.m.) receive a 5 dBA weighting.

3. Data presented in Appendix G of this document detail the calculation of noise impacts for each rail segment between the proposed Bolo Station Landfill and the general areas in which MRFs may be located. For the purposes of this analysis, it has been assumed that MRFs may be operated at the following locations:

   - City of Commerce.
   - One additional potential location on the rail segment between San Bernardino and the City of Commerce (Puente Hills).
   - San Bernardino.
   - Two potential locations on the rail segment between San Bernardino and Irwindale (also known as the Pasadena Subdivision).
   - Santa Clarita.
   - Victorville.

   Only the Commerce MRF has been sited and approved, and would be the only MRF assumed to operate during the 3,000 tons per day scenario. Actual locations of the other MRFs will be determined as the need arises. Subsequent MRFs will be subject to their own site-specific permitting, including CEQA analysis.

4. The results of rail noise calculation ar summarized by rail segment in Tables 5.5 an 5.5.2 and compare the potential increase in dis levels from conditions characterizing th N Action Alternative to the proposed a on Significant impacts are also noted on Tables 5. and 5.5.2.

5. As discussed in Section 5.13 of the af EIR/EIS, noise impacts would be consi re significant if one or more of the following er to occur:

   - Auditory damage to a sensitive recepto
   - Noise levels increase by more than 3 dB in an area which includes sensitive rece ors such as a residential area.
   - The CNEL value increases to 65 dBA o above a residential area.

   Generally, noise level increases less than 1 BA cannot be detected by the human ear. Noise ve increases between 1 and 3 dBA are detectab bu not considered significant. Noise level inci se greater than 3 dBA are detected and may be c id ered significant (David Evans & Associates ac 1992). For a significant impact to occu th sensitive receptors (e.g., residential areas, scl ols hospitals, etc.) and must also be located in ar re which exceeds a CNEL of 65 dBA to b th maximum recommended for CNEL levels residential area (County, 1989).

6. As shown in Tables 5.5.1 and 5.5.2, estir ec cumulative noise impacts associated wit h 3,000 and 21,000 tons per day scenarios ar no significant on any of the rail segments bet en the potential MRFs and the proposed Bolo S o Landfill.

5.5.2 SUPPLEMENTAL MITIGATION MEASU

1. The analyses documented in this section inc at that noise impacts associated with Rail•C trains transporting solid waste along existin ar lines in Los Angeles, Orange, River le San Bernardino, and Kern counties are o significant, and therefore do not require mitig on

TABLE 5.5.1

COMPARISON OF 3,000 TONS PER DAY AND NO ACTION ALTERNATIVE NOISE IMPACTS

RAIL SEGMENT	COMPOSITE CNEL AT DISTANCES INDICATED					
	100 feet	200 feet	400 feet	600 feet	800 feet	1,200 feet
NO ACTION ALTERNATIVE						
Bolo Station to Barstow	80	76	70	67	64	62
Barstow to Santa Clarita	73	69	63	59	57	54
Barstow to Victorville	80	76	70	66	64	61
Victorville to San Bernardino	80	76	70	66	64	61
San Bernardino to Irwindale	64	60	54	52	48	47
San Bernardino to Commerce	80	76	70	66	64	61
PROPOSED ACTION						
Bolo Station to Barstow	80	76	70	67	64	62
Barstow to Santa Clarita	73	69	63	59	57	54
Barstow to Victorville	80	76	70	66	64	61
Victorville to San Bernardino	80	76	70	66	64	61
San Bernardino to Irwindale	64	60	54	52	48	47
San Bernardino to Commerce	80	76	70	66	64	61
ESTIMATED INCREASE						
Bolo Station to Barstow	0	0	0	0	0	0
Barstow to Santa Clarita	0	0	0	0	0	0
Barstow to Victorville	0	0	0	0	0	0
Victorville to San Bernardino	0	0	0	0	0	0
San Bernardino to Irwindale	0	0	0	0	0	0
San Bernardino to Commerce	0	0	0	0	0	0
SIGNIFICANT INCREASE(1)						
Bolo Station to Barstow	No	No	No	No	No	No
Barstow to Santa Clarita	No	No	No	No	No	No
Barstow to Victorville	No	No	No	No	No	No
Victorville to San Bernardino	No	No	No	No	No	No
San Bernardino to Irwindale	No	No	No	No	No	No
San Bernardino to Commerce	No	No	No	No	No	No

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(1) Significance is determined by the following: (a) increasing CNEL to 65 dBA or above at a sensitive receptor or residential area, or (b) increasing CNEL by more than 3 dBA at a sensitive receptor or residential area.

TABLE 5.5.2

COMPARISON OF 21,000 TONS PER DAY AND NO ACTION ALTERNATIVE NOISE IMPACTS

RAIL SEGMENT	COMPOSITE CNEL AT DISTANCES INDICATED					
	100 feet	200 feet	400 feet	600 feet	800 feet	1,200 f
NO ACTION ALTERNATIVE						
• Bolo Station to Barstow	82	78	72	68	66	63
• Barstow to Santa Clarita	75	71	65	61	59	56
• Barstow to Victorville	81	77	71	67	65	62
• Victorville to San Bernardino	81	77	71	67	65	62
• San Bernardino to Irwindale	69	65	59	56	53	51
• San Bernardino to Commerce	81	77	71	67	65	62
PROPOSED ACTION						
• Bolo Station to Barstow	83	79	73	69	67	64
• Barstow to Santa Clarita	76	72	66	62	60	57
• Barstow to Victorville	82	78	72	68	66	63
• Victorville to San Bernardino	82	78	72	68	66	63
• San Bernardino to Irwindale	72	68	62	59	56	54
• San Bernardino to Commerce	81	77	71	68	65	63
ESTIMATED INCREASE						
• Bolo Station to Barstow	1	1	1	1	1	1
• Barstow to Santa Clarita	1	1	1	1	1	1
• Barstow to Victorville	1	1	1	1	1	1
• Victorville to San Bernardino	1	1	1	1	1	1
• San Bernardino to Irwindale	3	3	3	3	3	3
• San Bernardino to Commerce	0	0	0	1	0	1
SIGNIFICANT INCREASE(1)						
• Bolo Station to Barstow	No	No	No	No	No	No
• Barstow to Santa Clarita	No	No	No	No	No	No
• Barstow to Victorville	No	No	No	No	No	No
• Victorville to San Bernardino	No	No	No	No	No	No
• San Bernardino to Irwindale	No	No	No	No	No	No
• San Bernardino to Commerce	No	No	No	No	No	No

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(1) Significance is determined by the following: (a) increasing CNEL to 65 dBA or above at a sensitive receptor or residential area, or (b) increasing CNEL by more than 3 dBA at a sensitive receptor or residential area.

CHAPTER 6.0
CUMULATIVE IMPACTS

6.0 CUMULATIVE IMPACTS

OTHER PROJECTS IN THE AREA

Two sites, America Mine and Vulcan Mine, have been eliminated from this section since distribution of the Draft EIR/EIS for the proposed Bolo Station Landfill as they are no longer considered active projects by the County and BLM. In addition, Pacific Agriculture Expansion is now referred to as CLC and Leslie Salt is now referenced as Cargill.

The proposed Mesquite Regional Landfill in Imperial County was not evaluated in the Draft EIR/EIS as a cumulative project as it is outside the 50-mile radius of consideration for site-related cumulative impacts. There is no feasible overlap of impacts on air, water, or other resources from the proposed action and the Mesquite Regional Landfill. Rail transport for the proposed Bolo Station Landfill would be provided by ATSF, while Southern Pacific rail lines would be utilized for the proposed Mesquite project; therefore, rail transport impacts would not be cumulative. Potential cumulative impacts related to future MRFs in the urban areas of southern California would be appropriately addressed in site-specific CEQA documentation for each MRF.

Table 6.1 provides a revised list of significant existing activities and other proposed projects in the study region that are considered cumulative projects to the proposed action. The status and potential cumulative effects of the other projects are identified. Potential cumulative projects in the study area identified by the County and BLM are shown in Figure 6.1.

EVALUATION OF POTENTIAL CUMULATIVE IMPACTS

Except for the changes noted below, the cumulative impacts discussed in Chapter 6.0 of the Draft EIR/EIS remain valid. Only those resource areas for which the cumulative impacts have been revised since distribution of the Draft EIR/EIS are discussed below. The Draft EIR/EIS should be reviewed for a discussion of the cumulative impacts for resource area not included in this Supplement.

6.2.1 GEOLOGY AND SOILS

1. As discussed in Section 5.1.1.2.2, the cumulative ground settlement due to ground water withdrawal and landfill loading could be affected by the following:

   - An increase in the pumping rate of the Cargill wells or the installation of additional wells by Cargill.
   - The Rail•Cycle proposed onsite well.
   - The potential increase in the pumping rate of the CLC wells or additional wells installed by CLC.

2. The cumulative effect of these three situations would result in the range of calculated maximum settlement beneath the landfill increasing by 0.5 to 1.1 feet. This increases the maximum calculated settlement used as a conservative design basis for the proposed landfill from 4.3 to 14.5 feet, as discussed in Section 5.1.1.2.1, to 4.8 to 15.6 feet.

6.2.2 MINERAL RESOURCES

1. Several other proposed projects in the study region would be developing lands for purposes other than mineral resources. These projects include: CLC, Eagle Mountain Landfill (Riverside County), Hidden Valley Residuals Repository, Broadwell Basin Residuals Repository, and the Ward Valley Low-Level Radioactive Waste Facility. If these projects and the proposed Bolo Station Landfill are approved, over 21,000 acres would no longer be available for mining purposes. One of these projects, the Eagle Mountain Landfill is proposed to be located in former iron ore open pit mines. If this project is approved, remaining iron ore reserves will most likely not be mineable.

2. Three of the projects in the region, will develop or expand mineral resource exploitation: Fort Cady Mine, Hector Mine Expansion, and Parker Mine.

3. The southern portion of proposed landfill site is located in an area that has been reclassified by the BLM as valuable for prospecting for calcium chloride and prospectively valuable for sodium chloride (Waiwood, 1993). The BLM has

TABLE 6.1

PROJECTS IN CUMULATIVE IMPACT STUDY REGION

PROPOSED PROJECT[1]	STATUS[2]	POTENTIAL CUMULATIVE ENVIRONMENTAL ISSUES[3]
1. Fort Cady Mine	Application on file with County - project currently under environmental review.	3, 4, 5, 7, 8
2. Hector Mine Expansion	Approved by County and BLM in 1992.	3, 4, 5, 7, 8
3. Hidden Valley Residual Repository	Application on file with County - project currently under environmental review.	3, 4, 5, 6, 7, 8, 12, 13
4. Broadwell Basin Residual Repository	Application on file with County - project currently under environmental review. Draft EIR/EIS released for public review and comment in July 1992.	3, 4, 5, 6, 7, 8, 12
5. Parker Mine	BLM has completed its mineral rights validity examination and has determined that valid mineral rights exist.	3, 4, 5, 7, 8
6. Ward Valley Low-Level Radioactive Waste Facility	Application on file with state - project currently under environmental review.	3, 4, 5, 6, 7, 8, 12
7. Cadiz Land Company, Inc.	Application on file with County - Draft EIR distributed June 1993.	2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13
8. Desert Garnet Mine	Plan of operations submitted to BLM.	3, 4, 5, 7, 8, 10, 11, 13
9. Cargill Salt	Currently extracting and processing brines from Bristol Dry Lake.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
10. National Chloride	Currently extracting and processing brines from Bristol Dry Lake.	2, 3, 4, 5, 7, 8, 10, 11, 12, 13
11. Eagle Mountain Landfill	Final EIS/EIR certified by County in October 1992.	3, 4, 5, 7, 8, 12

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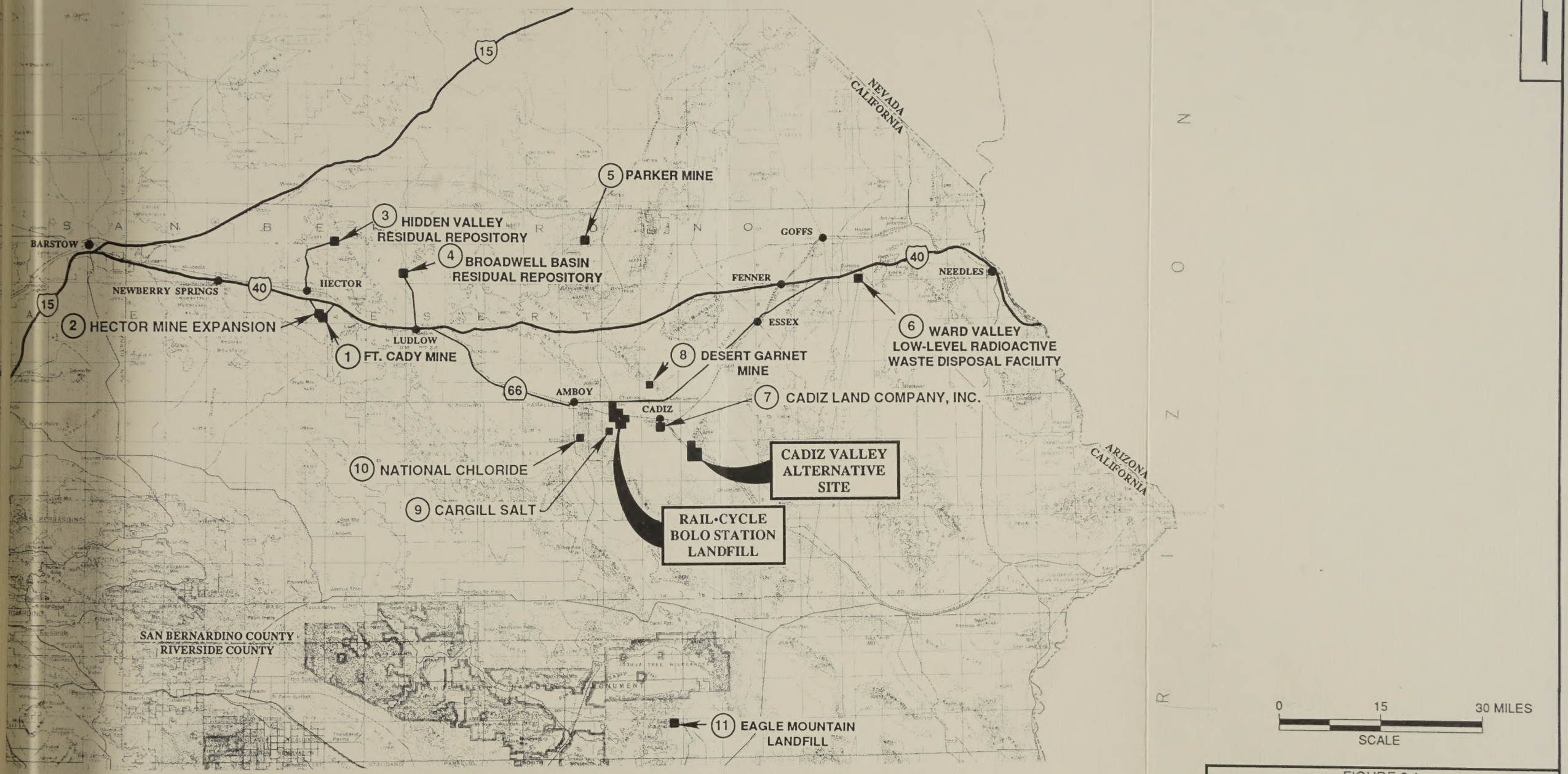
(1) See Figure 6.1 for location of proposed projects.

(2) Information on the status of proposed projects was provided by the County, except for the Eagle Mountain Landfill which was provided by County of Riverside and BLM.

(3) Issues:
1 Geology or Soils
2 Water
3 Vegetation
4 Wildlife
5 Air
6 Health/Safety
7 Visual Resources
8 Cultural/Paleontological Resources
9 Land Use
10 Socioeconomics
11 Noise
12 Mineral Resources
13 Transportation



NOTE: LOCATION OF PROPOSED PROJECTS IN THE VICINITY OF THE BOLO STATION SITE. SEE TABLE 6.1 FOR A DESCRIPTION OF THE STATUS AND POTENTIAL CUMULATIVE ENVIRONMENTAL EFFECTS.

FIGURE 6.1

PROJECTS IN THE CUMULATIVE IMPACT STUDY REGION

RAIL•CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

concluded that, while calcium and sodium chloride are present at the proposed site, commercial operations could not be sustained due to limited well field and the low concentrations of calcium and sodium. Profitable operations do not appear feasible if capitalization and amortization of new facilities are required (Waiwood, 1993). While National Chloride and Cargill have wells operating in the immediate vicinity of the proposed landfill that are used in their production of calcium chloride, there is no data to support that any additional potential for mineral development exists beneath the proposed site or in the areas immediately adjacent to the proposed site. Therefore, there is no cumulative impact associated with the proposed action or other projects in the area on the potential development of additional mineral resources in the vicinity of the proposed site.

2. SURFACE HYDROLOGY AND GROUND WATER

2.1 Surface Water and Drainage

Surface water runoff from the agricultural lands developed by CLC may contain fertilizers and/or pesticides which could contribute to surface water contamination.

2.2 Ground Water

Three of the projects included in the cumulative impact study region (i.e., CLC Expansion, the Cargill and National Chloride operations) are located in the Bristol ground water basin. The Draft EIR/EIS indicated that the Bristol Basin is currently in overdraft. Simulated ground water modeling conducted by Rail•Cycle indicates that the proposed ground water pumping for onsite uses would not significantly impact ground water resources. However, as described in Section 4.2.2 of this Supplement, the level of ground water recharge in the Bristol Basin is uncertain. The proposed ground water use for the expansion of the CLC agricultural operation is substantial (up to 30,000 acre-feet per year) in a basin that has a recharge rate that has been estimated to range from as low as 3,500 acre-feet per year to as high as 20,000 acre-feet per year (URS, 1993). Even at the high recharge rate, the proposed expansion of CLC's agricultural operation would result in a significant overdraft of the Bristol Basin.

2. Even though the proposed Bolo Station Landfill has a relatively low water use rate (i.e., approximately 130 acre-feet per year), when this is combined with the proposed 30,000 acre-feet per year that would be used by CLC and the current water withdrawn by Cargill and National Chloride, this represents a cumulative significant adverse impact. If the CLC expansion is approved, this significant adverse impact would occur whether or not the proposed Bolo Station Landfill is operational.

3. Projects located in the Bristol Basin also have the potential to cumulatively contaminate ground water, including:

   - CLC has the potential to leach fertilizer and pesticides into the ground water.
   - Cargill and National Chloride also have the potential (although to a lesser degree) to contaminate ground water through their operations (i.e., oil spills, radiator leaks, etc.).

6.2.4 LAND USE

1. The proposed action would result in 4,870 acres being withdrawn from the existing land use of open space. The proposed CLC expansion would utilize an additional 9,600 acres. In combination, these two projects would result in a cumulative impact of removing approximately 14,500 acres from existing land use as open space.

CHAPTER 7.0
TERMS AND ABBREVIATIONS

7.0 TERMS AND ABBREVIATIONS

7.1 DEFINITION OF TERMS

The definitions below are provided as clarification for terms used in this document.

TERM	DEFINITION
ctive fault	Fault with recent seismic activity as to have displaced materials not more than 12,000 years old.
lluvium	A general term for deposits made by streams on riverbeds, flood plains, and alluvial fans. The term applies to stream deposits of recent time.
ncillary facilities	Secondary support structure and equipment.
quifer	A body of rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs.
uthority to Construct (ATC)	Written permit which must be obtained from the SBCAPCD prior to construction, alteration, or replacement of any article, machine, or equipment which may emit air contaminants or affect in any way the emission of those contaminants.
ajada	Gently sloping distal portion of an alluvial fan.
asement rock	The undifferentiated rocks (commonly igneous or metamorphic) that underlie the rocks of interest in a given area.
edrock	The rock that underlies gravel, soil, or other superficial material.
erm	An earthen structure, generally several feet high, which acts as a barrier to make it difficult for a vehicle to cross, or which redirects the flow of traffic or water.
reccia	Rock consisting of fragments, more or less angular, in a matrix of finer grained material or of cementing material. May form by faulting or crushing (tectonic breccia), by erosion (clastic breccia), by collapse, by replacement bordering fractures, or by volcanism (e.g., *volcanic breccia*).
alifornia Desert Conservation rea (CDCA) Plan	BLM program which provides for the proper use of desert public lands and resources, while safeguarding the environmental, cultural, and aesthetic values.
alifornia Environmental Quality ct (CEQA)	Legislation enacted in 1970 to protect the quality of the environment for the people of California through requiring public agencies and decision makers to document and consider the environmental consequences of their actions.
one of depression	The depression produced in a water table or potentiometric surface by pumping.
onfining bed	A low permeability rock or soil formation that will not transmit water readily, and retards or stops the free movement of water underground. Confining beds have also been called aquicludes, aquitards, or semiconfining beds. Few deposits are completely impermeable--most will transmit some water, though slowly, hence aquifer and confining bed are relative terms.
ontrast	The effect of a striking difference in form, line, color, or texture of a landscape's features.

TERM	DEFINITION
Cumulative impacts	Two or more individual effects which, when considered together, are signific or compound or increase other environmental impacts. The individual effe may be changes resulting from a single project or a number of separ projects.
dBA	A-weighted decibel; decibel weighted to reflect sounds most sensitive to hum ears.
Discharge	Rate of flow at a given instant in terms of volume per unit of tin (1) pumping discharge equals pumping rate, usually given in gallons p minute; (2) stream discharge, usually given in cubic feet per second. ground water use, the movement of water out of an aquifer. Discharge m be natural, as from springs, seepage, or evapotranspiration, or it may artificial, with use of constructed drains or wells.
Discretionary actions	For the purpose of CEQA, these are actions or approvals by governmen agencies or boards that require the exercise of judgment or deliberation wh making a decision to approve, deny, or approve with conditions a propos project.
Drawdown	The lowering of the water table or potentiometric surface caused by pumpi (or artesian flow). Knowledge of the amount of drawdown at a given pumpi rate, over a specified length of time, is necessary to estimate the probal long-term effect on the water table.
Effective velocity	The actual or field velocity of ground water percolating through water-beari material. It is measured by the volume of ground water passing through unit cross-sectional area, divided by effective porosity.
Effects	Effect and impact are synonymous as used in this report. Direct or prima impacts are those caused by the project and occur at the same time and plac Indirect, or secondary, effects are those which result from the project whi occur later in time or farther removed in distance or time, but are st reasonably foreseeable.
Environment	The physical conditions which exist within the area which will be affected b a proposed project or alternative, including but not limited to land, air, wat minerals, flora, fauna, ambient noise, and objects of historical or aesthet significance. The area involved shall be the area in which significant effec would occur either directly or indirectly as a result of the project. Th environment includes both natural and man-made conditions.
Environmental Impact Report (EIR)	A detailed report prepared under the CEQA describing and analyzing th significant environmental effects of a project and discussing ways to mitiga or avoid the effects. An EIR is prepared for use by the public, public agenci and agency decision makers to weigh the environmental consequences of proposed action.
Environmental Impact Statement (EIS)	An analytical document that portrays potential impacts to the huma environment of a particular course of action and its possible alternativ prepared under NEPA. An EIS is prepared for use by the public, publ agencies, and agency decision makers to weigh the environment consequences of a proposed action.

TERM	DEFINITION
u	A fracture or fracture zone along which there has been displacement of the sides relative to one another as a result of seismic activity.
able	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.
o line	As applied to the movement of ground water, the path that a particle of water follows as it moves down the hydraulic gradient.
	The acceleration of gravity (32.2 ft/sec^2).
re waste compost	A mixture of decaying organic solid waste matter used as fertilizer.
rnd water	Water found beneath the land surface, in the zone of saturation below the water table.
ardous material	Substance which, because of its potential for either corrosivity, toxicity, ignitability, chemical reactivity, or explosiveness, may cause injury to persons or damage to property.
e (static)	The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point.
y aulic gradient	The gradient (slope) of the potentiometric surface or water table in the direction of the steepest slope, generally expressed in feet per foot or feet per mile. May also be stated as the change in static head per unit of distance in a given direction.
rmeable	Not capable of transmitting fluids or gasses in appreciable quantities.
ration	Movement of water through the soil surface into the ground. Infiltration takes place above the water table, as distinguished from percolation, which is the more or less horizontal movement of water in saturated material, below the water table.
ial study	A preliminary analysis prepared by the lead agency to determine whether an EIR or a Negative Declaration must be prepared or to identify the significant environmental effects to be analyzed in an EIR.
opic	Having physical properties (e.g., strength characteristics) which do not vary with direction.
opy	That condition in which all significant properties are independent of direction.
lfill condensate	Liquid from landfill gas resulting from the temperature decline of gas during collection.
lfill cover	Low-permeability compacted soil placed over completed sections of a landfill to minimize percolation of surface water through the waste and prevent scavenging.
dfill gas	Gas produced as part of the biological decomposition of the organic matter present in solid wastes.

TERM	DEFINITION
Landfill liner	Layer of low-permeability soil (clay) and/or synthetic material applied to bottom of the landfill to direct leachate to the leachate collection system a minimize leakage in cases of leachate production.
Leachate	Liquid resulting from decomposition of organic waste in a landfill wh contains dissolved waste materials.
Lead agency	The public agency which has the principal responsibility for carrying or approving a project.
Materials Recovery Facility (MRF)	A facility used to inspect and separate loads of waste for recoverable recyclable materials generated locally.
Mitigation	A method or procedures which may: (1) avoid an impact altogether by taking a certain action or parts of an action, (2) minimize impa by limiting the degree or magnitude of the action and its implementatio (3) rectify the impact by repairing, rehabilitating, or restoring the impact environment, (4) reduce or eliminate the impact over time by preservation a maintenance operations during the life of the action, and (5) compensate for t impact by replacing or providing substitute resources or environments.
Mitigation measure	Method or procedure undertaken for the purpose of avoiding or reduci potential impact(s) of an action.
National Environmental Policy Act (NEPA)	Legislation enacted in 1969 that require federal agencies to include in the decision-making processes: (1) appropriate consideration of all environmen effects; and (2) procedures to avoid or minimize adverse effects, and restore a enhance environmental quality as much as possible.
Notice of Preparation	A brief notice sent by the public agency with principle responsibility f carrying out or approving a project to notify other agencies that an EIR being prepared under CEQA.
Notice of Intent	Similar to the Notice of Preparation, used to notify other agencies and th public that an EIS is being prepared under NEPA.
Over-consolidation Ratio (OCR)	The ratio of preconsolidation stress to the existing vertical overburden stres Normally consolidated soils have an OCR = 1, and over-consolidated soi have an OCR greater than 1.
Ozone (O_3)	An end product of complex reactions between ROG and (or non-methan hydrocarbons) and NO_X in the presence of ultraviolet radiation.
Permeability	A measure of the relative ease with which a porous medium can transmit liquid under a potential gradient. It is a property of the medium alone and independent of the nature of the liquid and of the force field causing movemen It is a property of the medium that is dependent upon the shape and size of th pores.
Permit to Operate (PTO)	Permit which must be obtained from the SBCAPCD before the articl machine, or contrivance subject to an ATC is put into operation.

TERM	DEFINITION
tentiometric surface	The surface which represents the static head, especially in those aquifers in which water is confined under hydrostatic pressure. As related to an aquifer, it is determined by the levels to which water will rise in tightly cased wells. The water table is a particular potentiometric surface, all points of which are at zero hydrostatic pressure.
oject	The whole of an action, which has a potential for resulting in a physical change in the environment.
ospectively valuable	Used by BLM in the CDCA Plan to define areas of potential mineral value. Identifies areas having similar geologic conditions to other areas where minerals have been extracted; the inference being that similar deposits are probably present. This determination also includes those areas where there is information that the resource is present, but information as to the extent and quality cannot be ascertained. Under both conditions there should be a reasonable expectation that the deposit will meet at least the minimum characteristics for a valuable deposit (BLM, 1980a).
ubl land	Any land and interest in land owned by the United States within the several states and administered by the Secretary of the Interior through the BLM, without regard to how the United States acquired ownership, except: (1) lands located on the Outer Continental Shelf, and (2) lands held for the benefit of Indians, Aleuts, and Eskimos.
echrge	Process by which water infiltrates and is added to an aquifer, either directly or indirectly by way of another rock formation; also, the water itself.
esource	A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible. *Identified resources* are resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence.
esponsible agency	The organization that has the legal duty to ensure that a project complies with the appropriate rules and regulations.
ight-of-way	The right to pass over property owned by another. The strip of land over which facilities such as roadways, railroads, or power lines are built.
afe yield of an aquifer	The rate at which water can be withdrawn from an aquifer without depleting the supply to such an extent that withdrawal at that rate is: • Harmful to the aquifer itself (such as causing subsidence). • Harmful to the quality of the water (as in salt water intrusion). • No longer economically feasible.
aturated zone	Zone in which all the connected interstices or voids in rock or soil are filled with water under pressure equal to, or greater than, atmospheric pressure. The water table is commonly considered to be at the top of the zone of saturation.
eismicity	The likelihood of an area being subject to earthquakes.
gnificant effect	A substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.

TERM	DEFINITION
Source reduction	In this document, measures to reduce the amount or types of municipal so waste generated.
Specific yield	The ratio of: (1) the volume of water which the rock or soil, after bei saturated, will yield by gravity to, and (2) the volume of the rock or so The definition implies that gravity drainage is complete. In the natu environment, specific yield is generally observed as the change that occurs the amount of water in storage per unit area of unconfined aquifer as the res of a unit change in head. Such a change in storage is produced by the draini or filling of pore space and is therefore dependent upon particle size, rate change of the water table, time, and other variables. Hence, specific yield only an approximate measure of the relation between storage and head unconfined aquifers. It is equal to porosity minus specific retention.
Static water level	The level at which water stands in a non-pumping well; the prepumping lev Also, the level to which water eventually will return after pumpi has stopped, sometimes called the recovery level.
Subsidence	Sinking or settlement of the land surface, due to any of several processes b frequently from the removal of ground water. As commonly used, the ter relates to the vertical downward movement of natural surfaces, althou small-scale horizontal displacement also may be present.
Sump	An excavation dug in a storage area to collect spillage or drainage from t storage area. Usually an impermeable material is used to line the sump keep solution from escaping into the outside environment.
Transmissivity	Ability of a rock to transmit water under hydraulic head. The transmissivi is the rate of flow of water at the prevailing temperature, through a vertic unit-wide strip of the aquifer, extending the full height of saturation, und unit hydraulic gradient (one unit of head per unit of flow distance).
Threatened species	Species which, although not presently threatened with extinction, is like to become endangered in the foreseeable future in the absence of speci protection and management efforts.
Transmissivity (or transmissibility)	The rate of flow through a hypothetical vertical strip of the aquifer, where t strip is 1-foot wide and extends the full depth of the aquifer. It is calculat by taking the product of the hydraulic conductivity and the aquifer thickness.
Unconfined water	Ground water not under artesian conditions. Generally used to describe wat that does not rise above the level at which it is first found, at the time it found. Seasonal changes in both unconfined and confined water levels ma take place as a result of variations in recharge and discharge.
Underflow	Water moving parallel to a stream course through alluvium beneath t streambed.
Unsaturated zone	Zone in which the connected interstices or voids in a permeable rock a not filled with water and there can be movement of air. Generally, the zo between the land surface and the water table, but a zone of aeration can exi below an artesian aquifer, and below a perched water body.

TERM	DEFINITION
Vae Discharge Requirements WRs)	Regulations described in CCR Title 23, Diversion 3, Chapter 15, which governs discharge of wastes to land in order to preserve the quality of the state's surface and ground water.
Vae stream	The total sum of waste materials present from origin to disposal.
Vcing face	Portion of the landfill where solid wastes are presently being discharged.
Zor of influence	The area overlying the cone of pumping depression, or cone of water table depression. Also used with regard to tortoise survey transects beyond site boundaries.

7.2 DEFINITION OF ABBREVIATIONS

1. The definitions below are provided as clarification for abbreviations used in this document.

ABBREVIATION	DEFINITION
AB 939	Assembly Bill 939, also known as the California Integrated Solid Was Management Act of 1989
ACEC	Area of Critical Environmental Concern
ADT	Average Daily Traffic
AQMP	Air Quality Management Plan
ATSF	Atchison, Topeka, and Santa Fe Railway Company, Inc.
BLM	Bureau of Land Management
CARB	California Air Resources Board
Cargill	Cargill Company
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CEQA	California Environmental Quality Act
CIWMB	California Integrated Waste Management Board
CLC	Cadiz Land Company
cm/sec	centimeter per second
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CoIWMP	County Integrated Waste Management Plan
County	County of San Bernardino
CUP	Conditional Use Permit
dBA	A-weighted sound level in decibels
DMG	California Division of Mines and Geology
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
GCL	geosynthetic clay liner
HAZMAT	hazardous materials
HDPE	high density polyethylene
I-40	Interstate 40
LEA	local enforcement agency
MDAQMD	Mojave Desert Air Quality Management District

ABBREVIATION	DEFINITION
mg/L	milligrams per liter
MRFs	Materials Recovery Facilities
mph	miles per hour
msl	mean sea level
NEPA	National Environmental Policy Act
NPS	U.S. National Park Service
NO_x	oxides of nitrogen
OCR	Over-consolidation rate
O_3	Ozone
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
RDSI	Report of Site Disposal Information
ROG	reactive organic gases
ROWD	Report of Waste Discharge
RWQCB	California Regional Water Quality Control Board
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SEDAB	Southeast Desert Air Basin
SHPO	State Historic Preservation Officer
SO_x	sulfur oxide
SO_2	sulfur dioxide
SWFP	Solid Waste Facilities Permit
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
USGS	U.S. Geological Survey
UZM	Unsaturated Zone Monitoring
VOC	volatile organic compounds
WDRs	Waste Discharge Requirements
WMNA	Waste Management of North America, Inc.

CHAPTER 8.0
LIST AND QUALIFICATIONS OF PREPARERS

8.0 LIST AND QUALIFICATION OF PREPARERS

This Supplement has been prepared by Environmental Solutions, Inc. under the direction of the County Planning Department and BLM. The County and BLM provided information and assistance in preparing this report and independently evaluated the information contained herein.

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CHAPTER 9.0
ORGANIZATIONS AND PERSONS CONSULTED

9.0 ORGANIZATIONS AND PERSONS CONSULTED

The persons and organizations listed below submitted comments or substantial information regarding the proposed action during preparation of this document or its supporting documents. Persons or organizations contacted regarding specific information are listed by reference throughout the document and in Chapter 11.0.

FEDERAL AGENCIES

- U.S. Fish and Wildlife Service
  Laguna Niguel, California — Ray Bransfield
- National Park Service -
  Joshua Tree National Monument — Robert Moon

STATE AGENCIES

- Public Utilities Commission
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CHAPTER 10.0
DISTRIBUTION LIST FOR SUPPLEMENT

10.0 DISTRIBUTION LIST FOR SUPPLEMENT

The distribution list for the Supplement was developed by the BLM - California Desert District, and by the County Planning Department.

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  - Honorable George Brown
  - Honorable Al McCandless
  - Honorable Jerry Lewis
  - Honorable Duncan Hunter
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  - U.S. Air Force Flight Test Center
  - U.S. Army Corps of Engineers
  - U.S. Army National Training Center, Fort Irwin
  - U.S. Bureau of Indian Affairs
  - U.S. Bureau of Mines
  - U.S. Bureau of Reclamation
  - U.S. Soil Conservation Service
  - U.S. Department of Health and Human Services
  - U.S. Department of Justice, U.S. Attorney's Office (L.A. Branch)
  - U.S. Environmental Protection Agency, Office of Federal Activities
  - U.S. Federal Aviation Authority
  - U.S. Fish & Wildlife Service
  - U.S. Forest Service
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  - U.S. Marine Corps, Twentynine Palms Marine Corps Air Base
  - U.S. Marine Corps, Logistics Base
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  - Honorable Don Rogers
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  - Honorable Ruben S. Ayala
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  - California Air Resources Board
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  - California Energy Commission
  - California Highway Patrol
  - California Division of Forestry
  - California Integrated Waste Management Board
  - California Occupational Safety and Health Agency
  - California Public Utilities Commission
  - California Regional Water Quality Control Board/Colorado Region
  - California State Lands Commission
  - California State Office of Planning and Research
  - California State Resource Agency
  - Colorado River Board
  - Mojave Desert Air Quality Management District
  - Mojave Water Agency
  - Southern California Regional Rail Authority/Metrolink
  - South Coast Air Quality Management District
  - Southern California Association of Governments
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  - Town of Apple Valley
  - City of Azusa
  - Baker Communities Services District
  - Baker Unified School District
  - City of Barstow
  - Barstow Fire District
  - Barstow Heights Community Water District
  - Barstow Heights Community Services District
  - Big Bear Community Services District
  - City of Big Bear Lake
  - City of Chino
  - City of Chino Hills
  - City of Colton
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- Los Angeles County, Department of Regional Planning
- Los Angeles Department of Water and Power
- City of Montclair
- Morongo Basin Unified School District
- City of Needles
- Needles Fire Department
- Needles Water Department
- Needles Unified School District
- Newberry Springs Community Services District
- Newberry Springs Fire Department
- Newberry Springs Water
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- City of San Bernardino
- San Bernardino County Agricultural Commissioner
- San Bernardino County Board of Supervisors
- San Bernardino County Building and Safety Department
- San Bernardino County Department of Economic & Community Development
- San Bernardino County Department of Environmental Health Services
- San Bernardino County Department of Forestry and Fire Warden
- San Bernardino County Land Development Division
- San Bernardino County Local Agency Formation Commission
- San Bernardino County Museum
- San Bernardino County Planning Commission
- San Bernardino County Public Health Department
- San Bernardino County - AAO/ Public Works Group
- San Bernardino County Regional Parks
- San Bernardino County Sheriff's Department
- San Bernardino County Solid Waste Advisory Task Force
- San Bernardino County Solid Waste Management Department
- San Bernardino County Special Districts Office
- San Bernardino County Transportation/Flood Control
- San Diego County Department of Public Works
- Silver Valley Unified School District
- City of Twentynine Palms
- Twentynine Palms Chamber of Commerce
- Twentynine Palms Water District
- City of Upland
- City of Victorville
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- Town of Yucca Valley

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- A.K. Smiley Library
- Adelanto Branch Library
- Anaheim Public Library
- Apple Valley Branch Library
- Barstow Branch Library
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- Imperial County Library
- Joshua Tree Branch Library
- Lucerne Valley Branch Library
- Needles Branch Library
- Feldheym Central Library
- San Bernardino Branch Library
- Victorville Branch Library
- Twentynine Palms Branch Library
- Yucca Valley Branch Library

• NEWSPAPERS

- Desert Dispatch - Karen Kunde
- Desert Sun - Priscella Nordyke
- Desert Sun - Phil Hampton
- Desert Trail - Paula Menger
- Desert Trail - Howard Decker
- Hi-Desert Star - Kurt Schauppner
- Inland Valley Daily Bulletin - Lee Peterson
- Los Angeles Times - Tom Gorman
- Press-Enterprise - Environmental Reporter
- The Sun - Sam Atwood, Environmental Reporter
- The Sun - Chuck Mueller
- Victorville Daily Press

ORGANIZATIONS

- ADH Associates, Inc.
- All American Pipeline
- American Borate Company
- Aqua Caliente Indian Reservation
- Audubon Society
- Best, Best and Krieger, Attorneys at Law
- BFI
- Bighorn Institute
- BKK Corporation
- Bornhauser Company
- Bradco Development
- Bryan Stirrat & Associates
- Burrtec Industries
- Cadiz Land Company, Inc.
- California Communities Against Toxics
- California Federation of Mineralogical Societies
- California Mining Association
- California Association of 4WD Clubs
- California Native Plant Society
- Cargill Salt
- Citizens for Mojave National Park
- Coldwell Banker Realty
- Converse Consultants
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- Davis, Louise Baker Consultant
- Desert Citizens Against Pollution
- Desert Tortoise Preserve Commission
- Desert Bighorn Council
- Desert Protective Council
- Eagle Mountain Landfill and Recycling Center
- EBA Wastechnologies
- Ecology Center of Southern California
- EMCON Associates
- Environmental Defense Fund
- Friends of Mojave Road
- Gresham, Varner, Savage, Nolan & Tilden, Attorneys at Law
- Geosyntec Consultants
- Hall, Estill, Hardwick, Gable, Golden & Nelson
- Heaps Peak Enterprises
- Heller, Ehrman, White & McAulliffe
- Hidden Valley Resources
- High Desert Multi-Use Coalition
- Holcomb Valley Mining District
- Inland Container
- Jack's Disposal Company
- Janus Consultant Services, Inc.
- Kaiser Steel Resources
- Landfill Alternatives Save Environmental Resources (LASER)
- Lilburn Corporation
- Matich Construction
- Mine Reclamation Corporation
- Minerals Exploration Coalition
- National Chloride
- National Association of Mining Districts (Field Office)
- Native American Heritage Community
- Native American Observer - Phillip Ibanez
- Natural Resources Defense Council
- Newberry Springs Property Owners Association
- Ogden Environmental
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- Pfizer, Inc.
- Pacific Agricultural Holdings
- Pacific First Financial
- Page, George C - Museum
- Patrick & Henderson
- Ryan & Associates, Inc.
- SAIC
- SCS Engineers
- Sierra Club
- Sierra Club - Peter Burk
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- Sierra Club Legal Defense Fund
- Silver Valley Realty
- Southern California Edison
- Southwest Portland Cement
- Tehachapi Valley Research Center
- Total Waste Conversion, Inc.
- Twentynine Palms Reservation
- Warner Engineering
- Webber & Webber
- Western Mining Council
- Wilderness Society
- URS Consultants

• INDIVIDUALS

- Stephen Ahmann
- Sharon Apfelbaum
- Allen Arata
- Morris A. Balderman
- Mike Barbusca
- Allen Barter
- Bill Baskind
- Dana F. Bell
- Bob Bennett
- Elmo and Gloria Bennett
- Virginia C. Benton
- Howard Blair

- Gail Borchard
- Richard Brand
- Sylvester L. Brooks
- Orville and Louise Browy
- Mark Bulot
- Katie Cannarella
- Jean Carbone
- Christine Carraher
- Joyce and John Carraher
- Ruby Ceballos
- Vera Ciborowski
- Lois Clark
- William M. Claypool III
- Louis A. Conter
- Karen Crane
- Phylis Crawford
- John Curry
- Paul Davis
- William M. Davis
- James Dodson
- Joan Dotson
- Eric M. Ducat
- Deborah Edwards
- Gerald W. Eller
- Alice Engelskirchen
- Bill Faulkner
- Arthur and Iva Feldman
- Karen Felker
- Robert T. Filler
- Dave Fisher
- Mary Ann Fisher
- Warren and Elizabeth Forgey
- Charles W. and Donna L. Fox
- Mike Gallagher
- Wilson Goddard
- Frank J. Giesing
- George Goemans
- Mary Grimsley
- Howard Harsh
- Steven Hartman
- Mark Heuston
- John Heitman
- Oscar Hellrich
- Mary Ann Henry
- Esther L. Herbert
- Susan Hickman
- Frank Hoover
- Rick Horlacher
- Linda Horn
- Elden Hughes
- W. Leon Hunter
- Prescott and Paula Johnston
- Joe Kamansky
- Ellen Kindsvater
- Ray Kirkham
- Bert C. Klein
- Della Ann Knaggs
- Jean M. LaRose
- Patricia "Corky" Larson
- Dr. June Latting
- Harry Lawrence
- John and Mary Lohe
- Leland Lubinsky
- Gary Lopez
- Ruth Lopez
- Beverly Lowry
- William Manning
- D. J. Masker
- Valery Marshall
- Emmanuel N. Mba
- Kay Melcher
- Floyd and Anita Mercy
- Pat Mitchell
- George and M. Moore
- Dick Moyle
- Jim Murray
- Jean Nicol
- Brian Noonan
- Jim Norman
- Dr. Kenneth S. Norris
- Gary Overson
- Fred Owings
- Art Pacher
- Burr Patterson
- Carol Pedder
- Joe Pizzitola
- David Pilpel
- Stefan Pollmann
- Jim Poss
- Judith A. Pruitt
- William M. Raisner
- Martin Rapp
- Susan L. Reilly
- Robert Reyes
- Vernon and Twila Ring
- Bill Rinkes
- George W. Robinson
- Dr. John Rothenberry
- Marlene Russell
- David E. Sabol
- Connie Sachs
- Helene Schpak
- Billie Schwarz
- George Scott
- Dave Sharp
- Lynnette M. Shmakoff
- Nancy Sidhu
- Mark Siegmund

- Chris Smith
- Michelle Smith
- Robert and Deborah Staggs
- Harold Steingold
- Bernard D. Steppe
- John Stevens
- Katrina Stevens
- Mary Swedelius
- Ann Tate
- James and Julianne Toenjes
- Rebecca M. Turner
- Hildamae Voght
- Julia Ward
- Joan C. Welch
- Francis M. Wheat
- Cam Wheaton
- Carol Wiley
- Jane Williams
- Jeff Wright

INDIVIDUALS FOR WHICH NO ADDRESS WAS PROVIDED

- Kevin Barnes
- Patricia Chapman
- Shalinie George
- Richard Reynolds
- Don Rusk
- Fred Stearn
- Jane Williams

CHAPTER 11.0
REFERENCES AND RESOURCES

11.0 REFERENCES AND RESOURCES

BACKGROUND TECHNICAL REPORTS

Various technical reports have been prepared by Rail•Cycle which have been used in the preparation of the Draft EIR/EIS and this Supplement, as shown in Table 11.1. These technical reports are available for review at the following locations:

Planning Department
San Bernardino County
385 North Arrowhead Avenue
San Bernardino, California 92415

California Desert District
U.S. Bureau of Land Management
6221 Box Springs Boulevard
Riverside, California 92507

TABLE 11.1

BACKGROUND TECHNICAL REPORTS[1]

SUBJECT/REPORT	AUTHOR	DATE
GEOLOGY AND SOILS		
• Phase I: Geology, Hydrogeology and Hydrology; Site Characterization Study - Bolo Station Facilities	Jacobs	October 1990
• Phase II: Geologic, Hydrogeologic and Geotechnical Site Characterization Study - Bolo Station Facilities	Jacobs	December 199
• Gravity and Magnetic Studies of the Rail•Cycle Project Site	Shawn Biehler	May 28, 1991
• Geologic Mapping Southeast Bristol Mountains	Jacobs	July 1992
• Earthquake Damage Inspection Bolo Station Landfill and Surrounding Communities	Rail•Cycle	July 1992
• Geophysical Survey Report	Jacobs	December 199
• Ground Water Monitoring Well Installation Report	Jacobs	December 199
• Geophysical Field Exploration Report	Jacobs	March 1993
• Project Note No. 94	Jacobs	May 1993
• Technical Report: Response to Bureau of Land Management Inquiries Regarding Settlement Calculations for Bolo Station Landfill	Rail•Cycle	September 199
• Project Note No. 97	Jacobs	October 1993
MINERAL RESOURCES		
• Ground Water Monitoring Report (First Round) and Vertical Mineral Quality Assessment Study	WMNA	July 1991
• Mineral Potential Report for Selected Land in the Mojave Desert Bolo Station Facilities	Jacobs	August 1991
• Records Search of Mineral Resources on the Offered Lands	Jacobs	May 1992
• Position Paper - Rail•Cycle Bolo Station Landfill	Condor Earth Technologies	March 1993
• Hydrogeological and Geotechnical Assessment 500-Foot Borehole Bolo Station Landfill	Rust Environment and Infrastructure	October 1993
SURFACE HYDROLOGY AND GROUND WATER		
• Phase I: Geology, Hydrogeology and Hydrology; Site Characterization Study - Bolo Station Facilities	Jacobs	October 1990
• Ground Water Monitoring Report (First Round) and Vertical Mineral Quality Assessment Study	WMNA	July 1991
• Ground Water Monitoring Report	WMNA	
- Second Round		October 1991
- Third Round		November 1991
- Fourth Round		April 1992

(1) Those reports that are highlighted by shading are reports that have been prepared since distribution of the Draft EIR/EIS.

TABLE 11.1

BACKGROUND TECHNICAL REPORTS[1] (Continued)

SUBJECT/REPORT	AUTHOR	DATE
SURFACE HYDROLOGY AND GROUND WATER (Continued)		
Phase II: Geologic, Hydrogeologic and Geotechnical Site Characterization Study - Bolo Station Facilities	Jacobs	December 1991
Bolo Station Landfill - Evaluation of Regulatory Jurisdiction	LSA Associates	March 1992
Bolo Station Landfill, Design and Operational Features for Prevention and Mitigation of Ground Water Contamination	Rail•Cycle	October 1992
Potable Water Supply and Distribution: Water Supply Well Simulation	Rust Environment and Infrastructure	March 1993
Bolo Station Landfill Alternative Liner Design Evaluation Report	Rust Environment and Infrastructure	March 1993
Bolo Station Landfill, Summary Report of Potential Groundwater Impact and Ground Settlement Issues	Rust Environment and Infrastructure	June 1993
BIOLOGY		
Biology, Site Characterization Study, Preliminary Biological Survey-Bolo Station Facilities	Ecological Research Services	August 1990
Wintering Bird Survey - Bolo Station Facilities	Ecological Research Services	July 1991
Annual Plant Survey - Bolo Station Facilities	Ecological Research Services	August 1991 Revised March 1992
Desert Tortoise Survey - Bolo Station Facilities	Alice E. Karl in association with Ecological Research Services	September 1991 Revised March 1992
Desert Tortoise Survey Rail•Cycle Alternative Project Site - Cadiz Valley	Alice E. Karl in association with Ecological Research Services	March 1992
Kit Fox (*Vulpes Macrotis*) Density Study - Bolo Station Facilities	Ecological Research Services	July 1991 Revised March 1992
Sensitive Species Studies of Offered Lands - Bolo Station Facilities	Ecological Research Services	January 1992
List of Sensitive Plants and Animals in the Region Surrounding the Bolo Station Facilities Project Site	Ecological Research Services	March 1992
Literature Survey of Sensitive Species Rail•Cycle Alternative Site - Cadiz Valley	Ecological Research Services	June 1992
Biological Assessment: Bolo Station Landfill Project	Rail•Cycle	February 1993

(1) Those reports that are highlighted by shading are reports that have been prepared since distribution of the Draft EIR/EIS.

TABLE 11.1

BACKGROUND TECHNICAL REPORTS[1]
(Continued)

SUBJECT/REPORT	AUTHOR	DATE
AIR QUALITY		
• Air Quality Site Characterization Study - Bolo Station Facilities	Jacobs	October 1990
• Addendum to Air Quality Site Characterization Study - Bolo Station Facilities	Jacobs	October 1991
• Enhanced Dust Control Program - Bolo Station Facilities	James Dunbar in Association with Waste Management Regional Design Group	September 1991
• Air Quality Monitoring Data Report - Bolo Station Facilities	Jacobs	March 1991 through February 1992
• Air Quality Impact Analysis - Bolo Station Facility	Jacobs	February 1992
• Estimate of Leachate and Condensate Liquid Volumes and Volatile Organic Emissions from Evaporation Pond	Rail•Cycle	October 1992
• Rail•Cycle Bolo Station Landfill Supplemental Air Quality Analysis	Rail•Cycle	May 1993
CULTURAL/PALEONTOLOGICAL		
• Cultural Resources Site Characterization Study Class III Cultural Resources Inventory - Bolo Station Facilities	Michael Lerch and Associates	September 1990
• Addendum to Cultural Resources Site Characterization Study Class III Cultural Resources Inventory - Bolo Station Facilities	Michael Lerch and Associates	April 1991
• Cultural Resources Significance Evaluation and Treatment Plan - Bolo Station Facilities	Michael Lerch in Association with Mecko Archaeological Consulting	August 1991
• Confidential Paleontological Assessment - Bolo Station Facilities	San Bernardino County Museum	December 1991
• Cultural Resource Inventory and Significance Evaluation, Final Report, Rail•Cycle - Bolo Station Facilities	Michael K. Lerch	August 1992
LAND USE		
• Land Use Site Characterization Study - Bolo Station Facility	Jacobs	September 1990
• Land Use Application - Bolo Station Facilities	Rail•Cycle	March 14, 1991

(1) Those reports that are highlighted by shading are reports that have been prepared since distribution of the Draft EIR/EIS.

TABLE 11.1

BACKGROUND TECHNICAL REPORTS[1]
(Continued)

SUBJECT/REPORT	AUTHOR	DATE
MISCELLANEOUS		
San Bernardino County Initial Study	Asher Hartel	December 27, 1990
Rail•Cycle EIR/EIS Scoping Document - Bolo Station Facilities	Jacobs	December 1990
Alternative Rail•Cycle Landfill Sites: Preliminary Analysis	Jacobs	December 1990 Updated May 1991

91-109 (10/21/93/mg)

(1) Those reports that are highlighted by shading are reports that have been prepared since distribution of the Draft EIR/EIS.

11.2 REFERENCES

Biehler, S. *Gravity and Magnetic Studies of the Rail•Cycle Project Site, San Bernardino County, California.* 19

California Air Resources Board (CARB). *Notice of Public Meeting to Consider a Regulatory Plan for the C tro of Locomotive Exhaust Emissions, Mail-Out No. 91-36.* June 1991.

California Department of Finance. *Selected Population and Housing Characteristics: 1990.* San Bernard o County, California. 1991.

California Department of Finance. *Statewide Population Trends.* 1992.

California Integrated Waste Management Board (CIWMB). *Interim Statewide Landfill Capacity Report.* Prepa for: The Policy, Research and Technical Assistance Committee. January 1992.

California Integrated Waste Management Board (CIWMB). *Strategic Plan of the California Integrated Wa Management Board.* January 1993.

City of Commerce. Resolution PC No. 92-12: *Resolution of the Planning Commission of the City of Comme Certifying the Environmental Impact Report for the Rail•Cycle Project.* August 26, 1992.

City of Commerce. Exhibit A-2. *Recommended Condition for the Conditional Use Permit for the Rail•Cy Commerce Materials Recovery Facility.* January 1993.

Condor Earth Technologies, Inc. *Position Paper Rail•Cycle Bolo Station Landfill.* March 1993.

County of San Bernardino (County). *San Bernardino County General Plan.* Environmental Public Works Agen Department of Land Management, Office of Planning. Adopted July 1989, as revised.

David Evans and Associates, Inc. *Final Environmental Impact Report for the Rail•Cycle Materials Recov Facility, Commerce, California.* August 14, 1992.

Holtz, Robert D. and Kovacs, William D. *An Introduction to Geotechnical Engineering.* 1981.

Jacobs Engineering Group, Inc. *Phase I: Geology, Hydrogeology, and Hydrology Site Characterization Stu Bolo Station Facilities.* October 1990.

Jacobs Engineering Group, Inc. *Draft Phase II: Geologic, Hydrogeologic and Geotechnical Site Characterizati Study.* Vol. I. December 1991b.

Jacobs Engineering Group, Inc. *Geologic Mapping Southeast Bristol Mountains.* July 1992a.

Jacobs Engineering Group, Inc. *Ground Water Monitoring Well Installation Report.* December 1992b.

Jacobs Engineering Group, Inc. *Geophysical Field Exploration Report.* March 1993a.

Jacobs Engineering Group, Inc. *Project Note No. 94.* May 1993b.

Jacobs Engineering Group, Inc. *Project Note No. 97.* October 1993c.

Los Angeles County. *Solid Waste Management Status and Disposal Options in Los Angeles County.* City Los Angeles, Los Angeles Sanitation District, Los Angeles Bureau of Sanitation, and Los Angeles Coun Department of Public Works. January 1988.

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Mill, Paul. Personal communication., Fire Marshall, Forestry and Fire Warden Department, San Bernardino Cou'y. June 7, 1993.

Moc, Robert. U.S. National Park Service. Joshua Tree National Monument. Center for Arid Lands Restoration. Apri 1993.

Rail Cycle. *Benefits Analysis of Rail•Cycle Project for San Bernardino County.* October 1989.

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RailCycle. *Technical Report: Response to Bureau of Land Management Inquiries Regarding Settlement Cal lations for Bolo Station Landfill.* September 1993b.

Rai Cycle. *Engineering Calculation: Ability of HDPE Liner to Withstand Stretch Due to Settlement.* Oct er 1993c.

Riv side County. *Solid Waste Management Plan, Tri-Annual Revision.* Amended July 1989.

Ros , M.R. *Sedimentologic and Geochemical Constraints on the Evolution of Bristol Dry Lake Basin, California, U.S.. Palaeoclimatology, Palaeoecology, Volume 84.* 1991.

Rus Environment and Infrastructure. *Bolo Station Landfill Alternative Liner Design Evaluation Report.* Ma h 1993a.

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Ru Environment and Infrastructure. *Hydrogeological and Geotechnical Assessment 500-Foot Borehole Bolo Sta n Landfill.* 1993e.

So hern California Association of Governments (SCAG). *The Feasibility of Hauling Solid Waste by Railroad fro the San Gabriel Valley to Remote Disposal Sites.* April 1988.

Wa wood, Rob. *United States Department of the Interior Buruea of Land Management: Mineral Report - Mineral Po ntial. Evaluation and Surface Interference Report for Selected Public Lands Within the Rail•Cycle Project, Sa Bernardino County, California.* November 1993.

W te Management of North America, Inc. (WMNA). *Conceptual Site Development Plans for Rail•Cycle, Bo Station Facilities.* January 1991.

W ton Pringle and Associates. *Letter Report.* June 17, 1993.

CHAPTER 12.0
INDEX

12.0 INDEX

s index has been prepared in compliance with NEPA and Council on Environmental Quality regulations to aid the de n locating sections in this document where major issues and subjects of concern are discussed.

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educed Action Alternative	3.3.5
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APPENDIX A
SUPPLEMENT NOTICE OF INTENT

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3-00160

EPARTMENT OF THE INTERIOR

UREAU OF LAND MANAGEMENT

CA-060-5440-10 ZBAF]

roposed Plan Amendment, Land Exchange and Right-of-Way for Bolo Station Landfill, San ernardino County

GENCY: Bureau of Land Management, Interior

CTION: Notice of Intent to Prepare Supplemental Draft Environmental Impact Statement

UMMARY: Notice is hereby given that the Bureau of Land Management and the County of San ernardino will prepare a joint Federal-County Supplemental Draft Environmental Impact tatement/Environmental Impact Report (EIS/EIR) for a proposed land-exchange, right-of-way and an amendment to the California Desert Conservation Area Plan for the Rail-Cycle proposed Class I Bolo Station landfill disposal site, near Amboy, California. Additional information on Air uality, Geology and Groundwater has been developed which was not available in the draft EIS/EIR, distributed for public review in December, 1992. For this reason, a supplement to the draft EIS/EIR is being prepared for public review.

DATES: Written comments will be accepted, if received on or before September 7, 1993. The address for written comments is given before.

ADDRESS: For further information, contact Douglas Romoli, Bureau of Land Management, California Desert District Office, 6221 Box Springs Blvd., Riverside, CA 92507.

Jean Rivers-Council

0 3 AUG 1993

Date

JEAN RIVERS-COUNCIL, Acting

DISTRICT MANAGER

APPENDIX B
DRAFT EIR/EIS: TABLE 1.1-
SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
GEOLOGY AND SOILS					
• Seismic Hazard	• Maximum probable earthquake at the site may result in accelerations up to 0.09g due to movement on the Ludlow Fault. No known faults trend through or toward the site.	• Maximum probable earthquake at the site may result in accelerations up to 0.05g due to movement on the Ludlow Fault. No known or mapped faults or lineaments trend through or towards the site. Potential for seismic settlement, differential compaction, or liquefaction is very low. Some rock fall may occur from steep slopes.	• Same as proposed action.	• Structures onsite will be engineered and constructed per the Uniform Building Code to withstand the maximum probable acceleration with little or no damage. • A post-earthquake inspection plan will be developed. Damage incurred during a seismic event will be mitigated as soon as practical after the event.	• None.
• Subsidence	• Total ground settlement of up to 14 feet may occur in underlying soils. Additional ground settlement may occur from ground water withdrawal. Settlement may result in disruption of the liner system and leachate collection system. • Landfill settlement within the waste prism is anticipated to occur at a rate of 10 percent by height and 6 percent by volume, and could result in disruption of the landfill gas collection system and integrity of the final cover.	• Unknown, no subsurface studies conducted. Expected to be less than Bolo Station site due to placement of site on coarse, dense, cohesionless soil where depth to ground water is greater than 50 feet.	• Similar, but less than the proposed action, as less waste loading will be applied.	• Excavation prior to landfilling will be based on the natural ground water elevations and will be designed to offset the expected ground settlement while maintaining a minimum separation of 5 feet between waste and ground water. • A monitoring plan will be developed to evaluate whether the leachate and landfill gas collection systems are operating efficiently.	
• Collapsible/Expansive Soils	• Collapsible or expansive soils may exist within the upper 20 feet of soil.	• Unknown, no subsurface studies conducted.	• Same as proposed action.	• No mitigation required regarding collapsible/expansive soils. The upper 20 feet will be removed in preparation for landfilling and no significant impact is expected, therefore no mitigation required.	
• Volcanic Hazard	• Site is located seven miles west of Amboy Crater, an area of potential volcanic activity that could impact the proposed site.	• Site is located ten miles from Amboy Crater. Potential hazard would be less than for the Bolo Station site.	• Same as proposed action.	• The probability for renewed activity of the volcano is very low, and should not impact the site, therefore no mitigation is required.	

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.

(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
MINERAL RESOURCES					
• Brines	• In the event ground water contamination occurred, it could impact the Leslie Salt operations. • Dust and other airborne contaminants generated by the project may contribute to impurities in the salt evaporation tanks.	• In the event ground water contamination occurred, it is unlikely that the brines would be impacted, as the distance and ground water gradient provide adequate time to implement a corrective action program. • Similar impacts from dust and airborne contaminants may occur to salt evaporators on Cadiz Lake.	• Same as proposed action.	• The composite liner system, leachate collection system, landfill gas collection system, and final cover are designed to prevent contamination to underlying ground water. In the event that contamination occurs, ground water and landfill gas monitoring systems will be designed to detect contamination, as soon as practical. If water quality protection standards are exceeded, Rail•Cycle is required to implement a corrective action program to remediate the affected ground water. • In the event that ground water contamination occurred that rendered the brine useless or unprofitable, the following mitigation measures would be implemented: - A corrective action program. - A financial assurance program, funded by Rail•Cycle, to pay entities involved, including the federal government for increased purification costs or loss of a mineral resource. • Dust and other airborne contaminants which could potentially impact the salt evaporators will be controlled by frequent watering of unpaved roads and working areas, and operation of a landfill gas collection system.	• None
• Other Potential Minerals	• No rare, unique, or regionally significant mineral resources exist onsite. Access to sand and gravel deposits existing onsite will be eliminated, although these materials will be used for daily cover to the degree possible.	• Portions of Sections 5, 8, and 17 are included in an area considered to have potential uranium and/or thorium deposits. However, no field studies have been done to verify that economic deposits exist.	• Similar to proposed action, although slightly reduced due to smaller landfill footprint.		

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY					
• Drainage	• Existing surface drainage patterns result in surface flow across the site. If the surface flow is not controlled and diverted, landfill facilities and operations would be impacted. • Alteration of the existing drainage patterns onsite and downgradient of the site will occur. This will result in concentration and channelization of the surface flows, and increased erosion in the flow pathway.	• Similar to proposed action.	• Same as proposed action.	• An earthen drainage channel will be constructed to intercept and divert the stormwater to the 150-foot wide perimeter drainage channel system along the east and west boundaries of the proposed landfill. This channel will collect water flowing south of the railbed, redirect it around the perimeter of the landfill, and discharge it from the south side of the site. This channel will also intercept sheet flow runoff from the unloading area and railyard, and other nonlandfill areas adjacent to the channels. Each channel will be designed to carry the flow expected during the 100-year, 24-hour storm event. • A sedimentation basin and energy dissipators will be installed at the discharging end of the drainage channels to reduce flow velocity and resulting erosion. • Drainage structures will be inspected and maintained on a regular basis.	• Extraction of an additional annual average of 75 acre-feet of water will be a significant unavoidable adverse impact if the aquifer is currently overdrafted.
• Surface Water Contamination	• Surface water contamination may occur from discharge of stormwater which has become contaminated onsite.	• Similar to proposed action.	• Same as proposed action.		
• 100-Year Floodplain	• A small portion of the southwest corner of the landfill is located in the 100-year floodplain. Final design of the landfill will exclude landfilling in areas potentially affected by the 100-year floodplain.	• No impact; not located in the 100-year floodplain.	• Same as proposed action.		
• Ground Water Supply	• Approximately 75 acre-feet of water will be extracted from an aquifer which may already be in overdraft.	• No impact, aquifer is not expected to be in overdraft.	• Same as proposed action.	• Surface runoff from the active working area will be collected via temporary diversion ditches which will be constructed around each module or cell during the period it remains open for landfilling. Stormwater runoff will be diverted to an unlined collection sump and reused for dust control within the active work area only. The sump will be designed to hold runoff from the 100-year, 24-hour storm event. If overfilling or erosion damage occurred, the sump would immediately be restored and enlarged as required.	
• Ground Water Impairment	• Ground water impairment may result from a leak in the liner (leachate) or landfill gas migration through the liner.	• Similar to proposed action.	• Same as proposed action.		

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY (Continued)				• Stormwater discharges will require an NPDES permit. This permit will require regular testing of the perimeter drainage channels and retention ponds to insure stormwater discharged to the playa does not contain contaminants. Mitigation measures required by the NPDES permit will be implemented. • Drainage structures will be inspected and maintained on a regular basis. • The collection basin for surface runoff from the active working area shall be lined. • To reduce the quantity of water required by the proposed action: - Low-flow plumbing fixtures will be installed in all onsite facilities. - Washwater from cleaning waste containers will be collected, treated, and reused for container washing. - Surface runoff collected from the landfill will be retained in the sedimentation basin, and if necessary, treated and used for dust control. • If further analyses indicate that withdrawal of ground water is significantly affecting either the quantity of water available to the Leslie Salt wells, or the concentration of the brines at those wells, Rail•Cycle shall either reduce the pumping rate of its well until the impact is reduced to a less than significant level, or relocate its well to a location which shall not impact the Leslie Salt wells.	

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
HYDROLOGY (Continued)				• The single-liner system will be upgraded to a double-liner system. This double-liner system will include two leachate collection systems. • If leachate or landfill gas generated by the proposed action is determined to be contaminating ground water, a corrective action program will be developed and implemented.	
VEGETATION	• 2,700 acres of vegetation will be lost or disturbed.	• Similar to proposed action.	• Similar to proposed action, but would reduce acreage disturbed to 2,380 acres.	• Landfill cells will be revegetated during the final closure of each cell. Approximately 2,400 acres will be revegetated over the 60- to 100-year life of the project. • A native plant seed mixture will be used for revegetation. • Areas on which no project related facilities are to be located will be protected and avoided during construction and operations. • Construction and operational vehicles will be restricted, to the degree possible, to paved roads or designated unpaved roads. • Construction support yards will be restricted, to the degree possible, to areas disturbed by previous construction activities.	• None.

(1) The No Action Alternative was not included in this table, as there will not be any impacts associated with this alternative.
(2) For purposes of CEQA, a statement of overriding considerations is required for any significant unavoidable adverse impacts. While NEPA does not have a similar requirement, this information will be useful to the decision makers during preparation of the Record of Decision for the EIS.

TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
WILDLIFE	• The landfill may attract ravens, which prey on desert tortoises. • Kit fox, a species of concern to state biologists, may be impacted. • Project will result in 2,700 acres of lost native habitat, causing wildlife to relocate. • Noise, light, and increased traffic are not expected to impact wildlife. • Potential illegal collection of desert tortoise by landfill employees or visitors.	• The protected desert tortoise species has been identified onsite. Approximately 80 tortoises may be affected by implementation of the project. • Kit fox natal dens are also known for the site. The level of impact to these species would not be expected to be significant. • Bighorn sheep in the Ship Mountains may be impacted by operation of a landfill at the alternative site. • Project will result in 2,700 acres of lost native habitat, causing wildlife to relocate.	• Similar to proposed action, but acreage decreased to 2,380 acres of disturbed land.	• Construction Phase: - An education program regarding the desert tortoise will be developed for construction employees. - A regional raven study and monitoring program will be initiated and baseline data on raven concentrations, densities, feeding patterns, and nesting areas will be recorded. - Vehicle speeds will be restricted to under 20 mph (15 mph for trucks) during tortoise activity periods. - The working area of the site will be fenced prior to construction to preclude offsite tortoises from moving onto the site. Fences should be designed to discourage perching by ravens. - Kit foxes found onsite would be relocated to similar offsite environments. - As a precaution, initial land clearance prior to construction along the access road will be monitored by a qualified desert tortoise biologist or person trained by a qualified biologist. - If necessary, relocation of tortoises will proceed using state-of-the-art techniques, under the supervision of a qualified desert tortoise biologist. Tortoises will be relocated adjacent to the site boundary (north and east) with more favorable habitats during appropriate weather conditions. - Tortoises sighted by construction workers will be relocated appropriately.	• None.

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
WILDLIFE (Continued)				• Operations Phase: - An education program regarding the desert tortoise will be developed for landfill employees. - The regional raven study and monitoring program will continue with periodic monitoring to establish if changes are occurring. Changes that would adversely affect protected wildlife species will be remedied with mitigation measures developed in consultation with BLM and USFWS. - During the life of the facility, tortoises found onsite will be removed from danger and relocated under the supervision of a qualified desert tortoise biologist. - Fencing and facility operations will be designed such that waste does not blow out of the facility. Exposed waste or surface impoundments will have nylon lines or other approved methods to deter avian predators. - Vehicle speeds on access roads will be restricted to under 20 mph (15 mph for trucks) during tortoise activity periods. - Landfill cells will be revegetated during the final closure of each cell, minimizing the impact of onsite habitat loss.	

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TABLE 1.1

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
AIR QUALITY	• PM_{10} emissions would contribute to 24-hour and annual standard exceedances, as SEDAB is currently nonattainment for PM_{10}. • The project would emit NO_x and ROG, which are precursors to O_3 and therefore contribute to the existing O_3 exceedances. SEDAB is already a nonattainment area for O_3.	• Similar to proposed action.	• Same as proposed action.	• Permanent onsite roadways will be paved to minimize fugitive dust emissions. • A miscellaneous crushed base will cover unpaved roadways to minimize fugitive dust emissions. • Unpaved roadways will be sprayed regularly with water and chemical dust suppressants to minimize fugitive dust emissions. • Chemical binding agents will be applied to cover stockpiles to minimize wind erosion emissions. • Completed landfill cells will be revegetated to minimize wind erosion emissions. • Construction sequence will be designed to minimize double handling of cover soils. • Low-sulfur diesel fuel of 0.05 percent will be used to minimize SO_2, a (PM_{10} precursor) emissions. • Operation of a landfill gas collection system and associated landfill gas flare to minimize ROC/toxic air contaminant emissions. • Use of locomotives to transport waste as opposed to trucks. • Daily cover or an alternative daily cover, as permitted, will be placed over the compacted in-place waste during the day and over the working face at the end of each day to control odors. • Heavy-duty diesel operational equipment, which meets or exceeds state and federal emission standards applicable at the time of equipment acquisition, will be used (based on equipment availability).	• PM_{10} emissions, although reduced by mitigation measures, cannot be entirely mitigated. As the SEDAB is currently nonattainment for PM_{10}, any additional contribution to existing PM_{10} emissions will be a significant unavoidable adverse impact. • NO_x and ROG emissions, although reduced by mitigation measures, cannot be entirely mitigated. As the SEDAB is currently nonattainment for O_3, any additional contribution to existing O_3 precursors will be a significant unavoidable adverse impact.

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
AIR QUALITY (Continued)				• Ridesharing and vanpool programs will be implemented where feasible. • High combustion efficiency/ low-NO_x flare will be used to minimize O_3 precursor emissions. The flare would be replaced as the project matures by a gas turbine and then a steam boiler, both capable of producing electricity. • Emission offsets may be required for future site activities such as installation of a gas control flare or energy recovery facility.	
PUBLIC HEALTH AND SAFETY • Fire	• In the event a surface fire occurred (which is considered very unlikely) the following impacts could result: - Burn injuries and smoke exposure. - Loss of life. - Release of toxic emissions. - Structural and machinery damage. • In the event a subsurface fire occurred (which is considered very unlikely), the following impacts could result: - Accelerated or sudden settling of the landfill surface in the vicinity of the fire. - Venting of smoke through the cover material, which may emit various volatile and toxic compounds.	• Same as proposed action.	• Same as proposed action.	• Rail•Cycle will comply with state and federal procedures to provide prevention of and response in the event of potential fires. • Rail•Cycle will include provision of facilities for fire, and paramedic including trained response personnel and equipment including reserve water supply for firefighting. • MRFs (including potential transfer stations) will provide primary inspection to screen for hazardous and other unacceptable wastes. Receipt of wastes from facilities which do not provide prescreening for hazardous wastes will be restricted. Procedures and training for screening local inbound waste will be implemented to preclude landfill disposal of hazardous wastes, and minimize accidental exposure to workers and other persons.	• None.

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(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PUBLIC HEALTH AND SAFETY (Continued)					
• Hazardous Waste	• Small quantities of hazardous waste may be deposited in the landfill. • The handling, storage, and use of diesel fuels, lubricating oils, hydraulic fluids, and waste oils for recycling present a potential hazard.	• Same as proposed action.	• Same as proposed action.	• The small percentage of hazardous waste that would potentially be included in the waste stream is not expected to create a significant health or safety risks. • A temporary hazardous waste storage area will be sited, designed, and constructed pursuant to CCR Title 22.	
• Nuisance Vectors, Litter and Odors	• No significant impacts due to nuisance vectors, litter, and/or odors are expected from the proposed action.	• Same as proposed action.	• Same as proposed action.	• Compliance with state and federal material/waste exposure or disposal will reduce potential impacts to less than significant levels. • Compliance with the requirements of 40 CFR 112, and the California Health and Safety Code Chapter 6.67 of Division 20, including preparation of implementation of a SPCC plan and design, construction, and operation of facilities in accordance with the Oil Pollution Action of 1990, NFPA guidelines, Uniform Fire Code and API guidelines, will be implemented during design, construction and operation of the proposed action.	

SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PUBLIC HEALTH AND SAFETY (Continued)				• Preparation of site-specific community and employee right-to-know programs. • Design features shall be implemented to minimize operational spills and drips, and to collect spills and drips that occur for recovery and recycling. Fuel unloading equipment and onsite storage tanks that unload from the top to prevent spills will be used/installed. Track collection pans shall be installed to contain smaller spills and leaks. • SPCC plans shall include prevention and response for small spills and leaks that can occur during mobile equipment fueling. • Areas or locations for storage of various lubricating oils, hydraulic fluids, and waste oils for recycling shall be designed and operated in accordance with an SPCC plan. Areas shall be properly signed, fenced, and constructed on a concrete pad with proper containment. • Controls including, but not limited to, litter and security fencing, litter policing and inspection, and response to vector problems will be implemented to minimize nuisance vectors, litter, and odors.	
VISUAL RESOURCES	• During the 60- to 100-year operational life of the landfill, the visual qualities of the site will be impacted resulting in the proposed action not being compatible with the Open Space Element of the County General Plan.	• Similar to proposed action. Viewshed from the Cadiz Dunes would also be degraded.	• Same as proposed action, but of reduced areal extent and operating life.	• The final surface will be contoured in an undulating pattern so as to blend with surrounding topography. • The final surface will be revegetated for runoff control and to enhance visual blending with the surrounding area.	• The proposed action will not be compatible with the goals and policies of the Open Space Element (scenic resources) of the County General Plan.

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
VISUAL RESOURCES (Continued)	• The presence of the landfill and associated facilities and operations would substantially change the visual character of the site. • The construction and operation of the landfill will contribute to degradation of the Bristol Basin viewshed by changing the character of the site from passive to active use, with notable vehicle/rail movement and dust emissions. This impact would be reduced when the landfill closes. • Illumination of the night sky from nighttime landfill operations.			• Procedures to prevent illegal dumping will be established and enforced. • Procedures to minimize the presence of litter on the operating landfill will be established and enforced. • Onsite lighting will be directed inward and downward to minimize offsite illumination. • Onsite lighting will be shielded. • Dust control measures will be rigorously maintained to minimize emission of fugitive dust.	• The presence of the landfill will permanently change the visual character of the site, due to the establishment of an artificial mound on the flat desert floor and long-term, industrial activity in a rural portion of the desert. The illumination of the night sky will also change the visual character of the desert locale. These are considered significant unavoidable adverse impacts.
CULTURAL RESOURCES	• One of the 22 onsite cultural resources has been determined to meet the criteria for eligibility to the NRHP. This site, SBr-2910H, is a segment of the National Old Trails Road (1914-1943). This site will be affected by the proposed access road but a no adverse effect determination has been recommended by an "adaptive reuse" of the road. The BLM will consult with the SHPO and the ACHP as required by Section 106 of the National Historic Preservation Act.	• Unknown - The siting and operation of a landfill and associated facilities has the potential to adversely impact significant cultural resources which are as yet unknown.	• Same as proposed project.	• Construction and operations personnel will be briefed on the no collection policy for cultural resources situated both onsite and offsite. • Information on prehistoric and historic land use of the project area will be included in interpretive displays at the visitor's center. • An archaeological monitor will be present during grading and construction of the access road. • If necessary, a BLM-approved treatment plan will be developed and implemented.	• None.

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
(Continued)

ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PALEONTOLOGICAL RESOURCES	• Land-altering activities, both surface and subsurface, have the potential to disturb or destroy significant paleontological resources, if present. • Increased human presence, through establishment of a large onsite work force, could facilitate the recreational collection of significant fossils, which would destroy their scientific value. • Improved access to the site vicinity, through establishment of the access road from Route 66, could facilitate the recreational activities by the public, including fossil collection, in the near vicinity of the site and elsewhere in the basin accessible by the network of dirt roads.	• Impacts would be similar to the proposed action, based on archival data and a literature review.	• Impacts would be similar to the proposed action, but on a lesser scale.	• Resource evaluation will be conducted that includes known onsite resource localities and prioritizing significant sites. • Field salvage which consists of: - Intense inspection and removal of fossil sources at the most significant localities observed during previous field assessment. - Excavation monitoring to identify areas likely to contain significant paleontological resources. • Compliance will include identifying, curating, and permanently housing recovered fossils, and providing a report that indicates a paleontological resource mitigation program has been completed. • Construction and operations personnel will be briefed as to the proper procedures when working with a paleontological monitor and when fossils are discovered in an unmonitored situation. They will also be briefed on the no collection policy for paleontological resources. • Management will have adequate work-around plans, so work can be continued unimpeded away from a paleontological discovery site.	• None.

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	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
PALEONTOLOGICAL RESOURCES (Continued)				• Information on paleontology of the site and region will be included in interpretive displays at the visitor's center as part of a Public Information Program. This display will also include signs advising of the provisions of the Antiquities Act of 1906 and FLPMA.	
TRANSPORTATION					
• Highways	• Additional traffic on roads.	• Similar to the proposed action, but Cadiz Road would have to be surfaced in unpaved areas before project construction could begin.	• Similar to the proposed action, but with a smaller increase in traffic volumes.	• Turning lanes will be developed on Route 66 at entrance to site. • Maintenance and repair, as necessary, to Kelbaker Road and Route 66 from Kelbaker Road to the landfill entrance.	• None.
• Railways	• At full capacity (21,000 tons per day of waste), 14 one-way train trips per day, six days a week would be added to existing rail traffic. This would result in a 24 percent increase in the hazard index over non-project related values. It would also result in an additional 554-vehicle hours of delay (37 percent increase) over delays without the project.	• Similar to proposed action.	• Similar to the proposed action but with smaller increases in the hazard index and delays. Only eight one-way trains would be utilized, rather than 14. The hazard index would increase 16 percent over nonproject-related values and a 28 percent increase in delay time would occur.	• A Rail•Cycle sponsored ride sharing or busing program from areas where large numbers of employees reside will be implemented. • Trains will be scheduled to operate in urban areas during late night or early morning hours. • Coordination with the PUC will continue to evaluate and coordinate grade crossing improvements.	
NOISE					
• Railroad Corridors	• Noise levels along railroad corridors will increase. Average increases in Ldn are below or very near 3 dB, which is identified as the significant threshold.	• Similar to proposed action.	• Similar to proposed action, but slightly less.	• None identified. The recommended Ldn for residential development is not exceeded at distances of 800 feet.	• None.

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SUMMARY OF IMPACTS, MITIGATION MEASURES, AND UNAVOIDABLE ADVERSE IMPACTS
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ENVIRONMENTAL ISSUE	IMPACTS[1]			MITIGATION MEASURES	SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS[2]
	Bolo Station Site	Cadiz Valley Alternative Site	Reduced Action Alternative		
NOISE (Continued)					
• Landfill Operations	• Noise levels will increase due to landfill, offloading, and related operations. • Equipment operators onsite may experience excessive noise levels during working hours.	• Similar to proposed action.	• Similar to proposed action, but slightly less.	• Onsite structures with noise contours exceeding 65 dBA (400 to 500 feet from landfill and 100 to 200 feet from offloading facility) will be designed for appropriate noise attenuation. • An employee hearing protection program will be established which will specifically address equipment operators and other personnel working on or near heavy equipment.	
LAND USE					
• Consistency with Plans and Policies	• The County General Plan will have to be amended to assign appropriate land use designation for the proposed landfill. • The proposed action will not be compatible with the Open Space Element (mineral resource production and scenic resources) of the County General Plan. • The proposed action will result in a change in the land use of the site from limited use (Resource Conservation District) to intensive use for a period of 60 to 100 years.	• Same as proposed action.	• Same as proposed action.	• As the site of the proposed action is not addressed in the adopted CoSWMP, its approval would be based on compliance with AB 2296. If approved, the 1994 CoIWMP would reflect the selected site. • The County General Plan will be amended to reflect the proposed action. • The project will be subject to a CUP. • Construction activities will be subject to development requirements and review by the County Building and Safety Department.	• The proposed action represents a major modification of rural "limited use" to a intensive land use that is not compatible with the land use classification of Resource Conservation. • The proposed action will not be compatible with the Open Space Element (mineral resource production and scenic resources) of the County General Plan.
• Compatibility with Existing and Future Land Uses	• The proposed action will result in a significant change in the land use of the sites from limited to intensive.	• Same as proposed action.	• Same as proposed action.	• Solid waste disposal activities will be monitored by the SBCDEHS. • A land exchange in fee will occur consistent with BLM regulations and policies.	
• Land Exchange	• No significant impact.	• No significant impact.	• No significant impact.		

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SOCIOECONOMICS					
• Employment	• Employment demand would increase. The project would employ up to 262 personnel for construction and 267 for operation of the landfill. An additional 167 indirect jobs would be associated with the proposed action.	• Similar to proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced daily waste delivery and shortened life span of facility.	• Rail•Cycle will hire from the local labor force to the extent possible so that personnel requirements would have a positive effect on local employment. • To the extent practicable, Rail•Cycle will retain the temporary construction personnel for permanent landfill employment positions. • Rail•Cycle shall implement an ongoing training program so that persons initially hired for basic positions would be able to improve their skills and their employment status.	• Increased employment and population would accelerate consumption of local land and water resources and is a significant unavoidable adverse impact.
• Population	• Population of the area is expected to increase by up to 668 people, due to direct employment opportunities, and an additional 250 people due to indirect employment.	• Same as proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced employment or shortened life span of the facility.	• Rail•Cycle will hire construction workers from the local labor force to the extent possible to minimize the effect that temporary project construction requirements would have on local population fluctuations. • Rail•Cycle will hire landfill and train operations personnel from the local labor force to the extent possible to minimize the effect of the proposed action on local population growth. • To the extent practicable, Rail•Cycle will hire permanent operations personnel from the construction work force to minimize the number of workers and their families who move to the area.	

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SOCIOECONOMICS (Continued)					
• Housing	• It is expected that approximately 76 housing units will be required in the Morongo Basin area, and 76 housing units will be required in the Barstow vicinity. The virtual lack of available housing in the Morongo Basin communities will require new housing to be built or locations made available for RVs and trailers. Barstow housing stock is expected to be sufficient to meet project needs. Additional housing units will be needed for indirect employee housing - up to 38 in the Morongo Basin and 46 in the Barstow vicinity.	• Same as proposed action.	• Similar to proposed action, but at a lesser scale during operations due to reduced employment or shortened life span of the facility.	• A condition of construction and operations contracts will be that contractor personnel live in approved housing only.	• The establishment of additional housing in the project area would introduce a concentration of population that currently does not exist and is a significant unavoidable adverse impact.
• Public Services					
- Schools	• An additional three to four classrooms and three to four more personnel would be required at the elementary school.	• Same as proposed action.	• Similar to proposed action.	• Impacts to schools will be mitigated through school districts constructing additional classroom space.	• None.
- Health Services	• No health services are currently available in the immediate project area.	• Same as proposed action.	• Similar to proposed action	• None identified.	• None.
- Police and Firefighting	• Additional population would significantly increase the demands on police and firefighting services of the area.	• Same as proposed action.	• Similar to proposed action	• A fire/paramedic station will be established in the vicinity of the project area and Rail•Cycle will contribute to a fund for its construction, equipment, and staffing.	• None.

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SOCIOECONOMICS (Continued)				• In compliance with the County Fire Code, 180,000 gallons of water will be reserved for firefighting purposes. • Fire extinguishers will be located throughout the project site. • Fire hydrants and hoses will be located to service facilities. • Stored materials will be identified as to their risk of fire, and adequate and proper containment will be used. • Water trucks and tankers utilized in the landfill operation will be available to support the dedicated fire engine, if needed. • Buildings and structures will be designed to meet fire prevention standards required by the County Fire Marshall.	
- Solid Waste Disposal	• Increased populations may require a more formalized disposal program than currently exists.	• Same as proposed action.	• Same as proposed action.	• A solid waste disposal system will be established at the project site to assure appropriate disposal.	• None.
- Utilities	• Requirements for utilities service are expected to exceed existing capacity of facilities. This includes telephone, natural gas, and electric power.	• Same as proposed action.	• Same as proposed action.	• Telephone service will be established at the project site to serve the landfill. • Low sodium lighting shall be used onsite where possible. • A potable water supply and distribution system will be established at the project site to serve the needs of landfill personnel, contractors, and visitors.	• None.

91-109 (11/6/92/mg)

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APPENDIX C
CALIFORNIA STATE HISTORIC PRESERVATION OFFICE LETTER

E OF CALIFORNIA — THE RESOURCES AGENCY
E OF HISTORIC PRESERVATION
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PETE WILSON, Governor

26 April 1993

Reply to: BLM 930329A

Henri Bisson, District Manager
Bureau of Land Management
California Desert District Office
6221 Box Springs Boulevard
RIVERSIDE CA 92507-0714

Subject: RAIL-CYCLE BOLO STATION FACILITIES ARCHAEOLOGICAL REPORT

Dear Mr. Bisson:

Thank you for consulting with us in compliance with Section 106 of the National Historic Preservation Act.

You have asked me to review the supporting information for your determination that 21 archaeological sites within the Rail-Cycle APE are ineligible and that the archaeological site CA-SBr-2910H is eligible for inclusion in the National Register under Criterion D. I agree that part of the evaluation you conducted was adequate and I concur with your finding that the following archaeological sites are not eligible:

CA-SBr-58, CA-SBr-5814H, CA-SBr-6677, CA-SBr-6678, CA-SBr-6679, CA-SBr-6680, CA-SBr-6681, CA-SBr-6682, CA-SBr-6683, CA-SBr-6684, CA-SBr-6685H, CA-SBr-6686H, CA-SBr-6687H, CA-SBr-6688H, CA-SBr-6689H, CA-SBr-6690H, CA-SBr-6691H, CA-SBr-6692H, CA-SBr-6693H, CA-SBr-6694H, and CA-SBr-6834H

Your letter also requests my concurrence that a section of the National Old Trails Road (CA-SBr-2910H) is eligible for inclusion in the National Register under Criterion A. I agree.

I also do not object to your determination that this undertaking will not affect historic properties. Accordingly, you have fulfilled federal agency responsibilities pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act. Please note that your agency may have additional responsibilities under 36 CFR 800 under any of the following circumstances;

(1) If any person requests that the Advisory Council on Historic Preservation review your findings in accordance with 36 CFR 800.6(e);
(2) If this undertaking changes in ways that could affect historic properties [36 CFR 800.5(c)];
(3) If previously undocumented properties are discovered during the implementation of this undertaking or if a known historic property will be affected in an unanticipated manner [36 CFR 800.11];
(4) If a property that was to be avoided has been inadvertently or otherwise affected [36 CFR 800.4(c);800.5]; or

(5) If any condition of the undertaking, such as a delay in implementation or implementation in phases over time, m justify reconsideration of the current National Registe status of properties within the undertaking's Area of potential Effects [36 CFR 800.4(c)].

If you have any questions, please telephone Nicholas De Cioppo of my staff at (916) 653-9696.

Sincerely,

Steade R. Craigo, AIA, Deputy
State Historic Preservation Officer

APPENDIX D
SECTION 7 BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
Ventura Field Office
2140 Eastman Avenue, Suite 100
Ventura, California 93003

August 4, 1993

Memorandum

To: State Director, Bureau of Land Management, Sacramento, California

From: Field Supervisor, Ecological Services - Ventura Field Office, Ventura, California

Subject: Biological Opinion for the Rail-Cycle/Bolo Station Landfill Project, San Bernardino County, California (CA-932.5, 1-6-93-F-16)

This biological opinion responds to your request for formal consultation with the Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated May 12, 1993, and received by us on May 17, 1993. At issue are impacts resulting from proposed construction and operation of the Rail-Cycle/Bolo Station Landfill Project in San Bernardino County, California, which may affect the desert tortoise (Gopherus agassizii), a federally listed threatened species.

This biological opinion was prepared using information from the following sources: your May 12, 1993, request for consultation; the biological assessment for the project (Rail/Cycle 1993); a survey of desert tortoises in the project area (Karl 1992); informal consultation between our staffs; and our files.

Biological Opinion

It is the opinion of the Service that the proposed project is not likely to jeopardize the continued existence of the desert tortoise. Critical habitat has not been designated for the Mojave population of the desert tortoise in California; therefore, no critical habitat will be affected by the proposed action.

Description of the Proposed Action

The following project description is taken from Rail/Cycle 1993). Rail/Cycle proposes to construct and operate a Class II, nonhazardous solid waste landfill (as defined in California

Code of Regulations (CCR), Title 23) at the Bolo Station site, about six miles east-southeast of Amboy, California (Figure 1) Waste, packaged in 40 to 45-foot shipping containers, would be transported to the site from southern California coastal cities via existing rail lines. Once at the site the waste would be compacted and covered in excavated landfill cells, in accordanc with State of California regulations (CCR Title 23). Initial operation would begin with 3,000 tons of waste per day, but wou increase to a maximum of 21,000 tons of waste per day within fi to seven years. The landfill would disturb 4,800 acres over th 66+ year project life.

The project includes construction of up to seven material recovery facilities in urban areas of southern California at which waste would be separated, compacted, and loaded into containers. Each material recovery facility would be capable o loading 3,000 tons of waste into 120 containers on 60 rail cars per day. The waste would be transported to the site via the existing Atchison, Topeka, and Santa Fe Railroad line. Currently about 48 trains use the tracks daily. Transport of the waste t the Bolo site would increase this traffic to 55 trains per day.

The project would occur in two phases: construction and operation. During the construction phase the following facilities would be constructed at the Bolo Station site:

1) Initial landfill and leachate collection system

2) Portions of the rail yard and off-loading facility to support a minimum of two trains

3) Hazardous waste temporary storage area

4) Lined evaporation pond(s)

5) Water supply and storage facilities

6) Fencing of the site

7) Utilities network

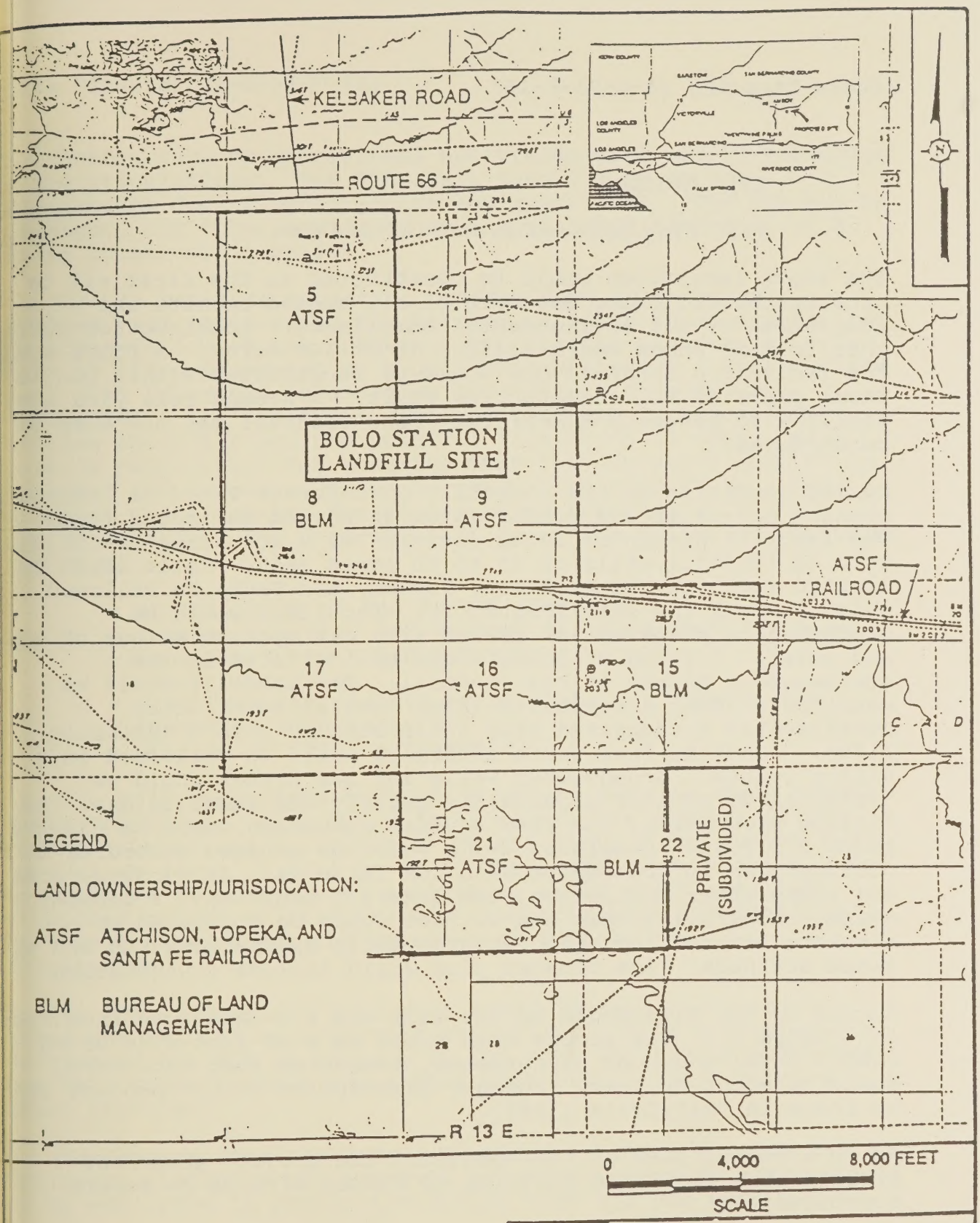
8) Entrance/on-site service roads and railroad overpas

9) Public waste drop-off facility

10) Visitor center and administration facilities

11) Equipment maintenance facilities

12) Fuel storage sites



EFERENCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS OF AMBOY, BRISTOL LAKE NW, CADIZ, AND CALUMET MINE, SAN BERNARDINO COUNTY, CALIFORNIA. AMBOY, CADIZ, AND CALUMET MINE ARE PROVISIONAL EDITION MAPS AND ARE DATED 1985. BRISTOL LAKE NW IS DATED 1954 AND PHOTOREVISED IN 1984.

NOTE: PROVISIONAL EDITION MAPS SHOW CONTOUR INTERVALS, SPOT ELEVATIONS AND U.T.M. COORDINATES IN METERS. BRISTOL LAKE NW IS ON THE DATUM FOR 1927. CONTOUR INTERVALS AND SPOT ELEVATIONS ARE MEASURED IN FEET.

FIGURE 1
SITE LOCATION MAP

RAIL·CYCLE
BOLO STATION LANDFILL

ENVIRONMENTAL SOLUTIONS, INC.

13) Helipad

14) Fire/paramedic/sheriff station

The above facilities would be constructed in the first six to nine months following issuance of all needed permits and completion of all environmental compliance. Construction durin this initial phase would disturb about 360 acres. A flare syst for recovering landfill gas would be constructed within two to three years of the construction start. A second rail yard and facility to generate electricity from landfill gas may also be constructed.

During operation of the landfill, disturbance would be limited opening new cells and construction of needed perimeter roads. The landfill design includes division of 2,100 acres of the sit into 46 landfill cells of 45 to 60 acres each. Cells would be located south of the Atchison, Topeka, and Santa Fe Railroad which bisects the site (Figure 1). Each cell would be sequentially prepared and filled with its optimum volume of was and cover. Filling of cells would be initiated in the southwestern corner of the landfill. The landfill would be constructed over a composite liner consisting of water consolidated recompacted clay soils coupled with a synthetic liner. Leachate from waste materials would be collected in a piping system. Groundwater wells and gas probes would be installed to monitor groundwater quality and landfill gas. As filling progresses, the land surface elevation would be elevated about 375 feet. Completed cells would be managed according to a closure plan in accordance with CCR Title 14. At closure, some 66+ years after initiation, the landfill would have a general T-shape. Landfill slopes and surface would be contoured to simulate natural foothill features while maintaining top and sid slope drainage. The closure plan would include revegetation.

Access to the site would be via rail and a 2-lane road from Rout 66 (Figure 1). The access road would be a 24-foot wide paved road. Total width of disturbance, including road shoulders, would be about 50 feet. Further description of the project can be found in Rail/Cycle (1993).

As an integral part of this project, the project proponent proposes the following measures to reduce effects on desert tortoises:

(1) Rail Cycle shall designate a "field contact representative" (FCR) who will be responsible for overseeing compliance with protective stipulations for the desert tortoise and for coordination on compliance with the Bureau of Land Management (Bureau). The FCR shall have the authority to halt

all construction or operational activities that are in violation of the stipulations. The FCR shall have a copy of all stipulations during construction and operations. The FCR may be a manager, any other employee, or a contracted biologist (e.g., during construction phase).

(2) An employee education program must be received, reviewed, and approved by the Service at least 15 days prior to the presentation of the program. The program may consist of a class or video presented by a qualified biologist. Wallet-sized cards with important information for workers to carry are recommended. All employees shall participate in the desert tortoise education program prior to initiation of work. Rail Cycle is responsible for ensuring that the education program is developed and presented prior to conducting activities. New employees shall receive formal, approved training prior to working on-site. The program shall cover the following topics at a minimum:

- distribution of the desert tortoise
- general behavior and ecology of the desert tortoise
- sensitivity to human activities
- legal protection
- penalties for violations of State and Federal law
- reporting requirements
- project mitigation measures

(3) Only biologists authorized by the Service shall handle desert tortoises. Rail Cycle shall submit the name(s) of the proposed authorized biologist(s) to the Service for review and approval at least 15 days prior to the onset of activities. No construction or operational activities shall begin until an authorized biologist is approved. Authorization for handling shall be granted under the auspices of this section 7 consultation.

(4) The authorized biologist shall be required on-site during the initial construction activities. This biologist (in addition to the FCR or working as the FCR) shall have authority from Rail Cycle to halt any action that might result in harm to a desert tortoise.

(5) Except when absolutely required by the operation and as explicitly stated in the approval document, cross-country vehicle use by employees is prohibited during work and non-work hours.

(6) Any desert tortoise found within areas to be disturbed by the project shall be moved off-site by an authorized biologist. All desert tortoises moved shall be marked for future identification. An identification number using the acrylic paint/epoxy covering technique shall be placed on the fourth left

costal scute as described in handling protocol sections of the "Protocols for Handling Live Tortoises" (Arizona Game and Fish Department et al. 1991). Slide photographs (35mm) shall be take of the carapace, plastron, and fourth costal scute. No notchinc is authorized.

(7) Desert tortoises may be handled only by the authorized biologist and only when necessary. In handling desert tortoises the authorized biologist shall follow the general handling protocol sections of the "Protocols for Handling of Live Tortoises" (Arizona Game and Fish Department et al. 1991). New latex gloves shall be used when handling each desert tortoise to avoid the transfer of infectious diseases between animals. Replacement of lost fluids with a syringe is not authorized. Desert tortoises shall be moved to the entrance of the nearest unoccupied burrow of appropriate size. In general, desert tortoises should be moved the minimum distance possible to ensur their safety. If a desert tortoise needs to be moved at a time of day when ambient temperatures are extremely low (i.e., less than 40 degrees Fahrenheit) and could result in harm to the desert tortoise, it shall be held overnight in a clean cardboard box. The desert tortoise shall be kept in the care of the authorized biologist under the appropriate controlled temperatures and released the next day when temperatures are favorable. All cardboard boxes shall be properly discarded afte one use.

(8) The authorized biologist shall maintain a record of all desert tortoises handled. This information shall include for each desert tortoise:

(a) the locations (narrative and maps) and dates of observations;

(b) general condition and health, including injuries and state of healing, and whether animals voided their bladders;

(c) location moved from and location moved to;

(d) diagnostic markings (i.e., identification numbers or marked lateral scutes);

(e) slide photograph (35mm) of each handled desert tortoise

(9) No later than 90 days after completion of construction, the FCR and authorized biologist shall prepare a report for the Bureau and the Service. The report shall describe the effectiveness and practicality of the mitigation measures, the number of desert tortoises moved from the site, the number of

desert tortoises killed or injured, and specific information for each desert tortoise as described in measure (8). The report shall make recommendations for modifying the stipulations to enhance protection or to make it more workable for Rail Cycle.

(10) Upon locating a dead or injured desert tortoise, Rail Cycle is to notify the Service, Ventura Field Office, within three working days of the finding. Written notification must be made within five days of the finding, both to the appropriate Service Field Office and the Service Division of Law Enforcement in Torrance, California. The information provided must, at a minimum, include the date and time of the finding or incident (if known), location of the carcass, a photograph, and cause of death (if determinable). Desert tortoise remains shall be collected and frozen as soon as possible pending further direction. Injured animals shall be transported to a qualified veterinarian for treatment at the expense of the project proponent. If an injured animal recovers, the Service should be contacted for final disposition of the animal.

(11) Vehicle speeds on roads shall not exceed 20 miles per hour through desert tortoise habitat.

(12) If it is necessary for a worker to park temporarily in desert tortoise habitat, the worker shall inspect for desert tortoises under the vehicle prior to moving it. If a desert tortoise is present, the worker shall carefully move the vehicle only when the desert tortoise would not be injured by moving the vehicle or shall wait for the desert tortoise to move out from under the vehicle.

(13) Rail Cycle shall participate in a cooperative common raven (Corvus corax) survey with the Bureau. The survey will be a regional study to assess the density and location of ravens within a 30-mile radius of the project site. The raven study, initiated in December, 1992, will continue for one year prior to the startup of landfill operations. The study may be conducted up to five years following the startup of operations. Should monitoring indicate that the raven population is significantly increasing, despite passive control measures taken at the landfill, and is threatening desert tortoise populations, then an active raven control program will be implemented immediately. This program will include one or more of the following control measures: nest destruction, poisoning, alteration of landfill operations, or any other measures that the responsible agencies deem appropriate.

(14) All necessary depredation permits, plus a comprehensive raven management/control program, will be developed and in-place before landfill operations begin. We recommend that a raven monitoring control group be established at the time of

construction. The control group should have representation fro the Bureau, Service, California Department of Fish and Game, Ra Cycle, and any other agency representative or individual that t State and Federal agencies believe appropriate. The raven monitoring control group would oversee the raven monitoring and control program, evaluate monitoring data, and make decisions or the timing and implementation of the raven control program and/c any part thereof. If an active raven control program becomes necessary, but it is not implementable due to political or legal constraints, then the impact to the desert tortoise would be significant but unmitigatable.

(15) No ponded water shall remain on-site for more than 24 hours to avoid watering of potential desert tortoise predators, except in storm water retention ponds which would be protected using fish-netting erected above the ponded areas.

(16) All trash and food items shall be promptly contained within closed, raven-proof containers. The containers shall be regularly emptied and/or removed from the project site to reduce attractiveness of the area to ravens and other desert tortoise predators.

(17) Structures that may function as raven nesting or perching sites shall be designed and maintained to limit their usefulness as perches to the extent possible.

(18) Daily, intermediate, and final cover shall be maintained in accordance with CCR Title 23. The cover material shall be applied as follows:

(a) Daily cover may consist of a 6-inch thick layer of soil or an equivalent alternative cover if permissible under the solid waste facilities permit. The placement of daily cover should control vermin, birds, and predator species.

(b) Intermediate cover shall be applied to all landfill waste when the area is to be left for an extended period of time (i.e., intermediate slope between cells) while landfilling operations are carried on in adjacent cells.

(c) Final cover shall be applied in accordance with the closure/post-closure requirements of the solid waste facilities permit. Beginning with cell No. 1, and following maximum filling of the cell, closure plans will be enacted. The cell shall be planted with typical desert flora, thereby not constituting a permanent habitat loss.

(19) Fences and overhead power lines and structures shall e designed and installed to discourage perching.

(20) Initial land clearance along the access road in ection 22 and the eastern half of section 15 shall be conducted n the presence of a qualified biologist.

(21) Relocation of desert tortoises shall proceed using tate-of-the-art techniques according to protocol of the alifornia Department of Fish and Game and the Service and shall ccur adjacent to the eastern or northern edge of the facility uring appropriate weather conditions. Unoccupied burrows of ppropriate size nearest the point of capture should be utilized s these may be familiar to the relocated animals, depending upon he distance of the relocation point from the capture point. lternatively, desert tortoises may be placed in the shade of hrubs if the weather is appropriate. All relocated animals hall be observed for as long as is necessary (to be determined y a qualified biologist) to ensure the safety of the animals. ests shall be relocated in a site simulating the original nest ite. Each desert tortoise nest shall be caged initially in such a manner that predators will be excluded but normal thermal elations in the nest will be maintained. Following a period of ne month (in which time local predators should become habituated to initial disturbance at the nest site), cages may be removed; ests shall then be monitored periodically to determine progress f hatching and success of anti-predation measures. lternatively, cages may be kept in place through hatching, as ong as the nests are closely monitored through the hatching eriod such that hatchlings are not endangered.

(22) In construction areas, any desert tortoises sighted by orkers shall be relocated appropriately. Workers shall be ducated as to the natural history, endangerment factors for esert tortoises, and appropriate relocation protocol. The ducation program shall be established in consultation with esert tortoise biologists and approved by the Bureau and the ervice.

(23) During the life of the facility any desert tortoises hat are found on-site shall be removed from danger and elocated. The relocation protocol shall be established in onsultation with desert tortoise biologists and approved by the ureau and the Service.

(24) Debris fencing and facility operations will be esigned and installed to prevent blowing of trash. During high ind periods landfilling operations will be carried out in wind- erm protected areas. Debris fences will be maintained downwind rom the working face to trap blowing debris. Debris fences will e cleaned on a frequent basis, a minimum of once daily. Debris

not collected on the fences will be policed daily or on an as needed basis to prevent cluttering of downwind areas.

(25) Nylon lines shall be erected and maintained over the working face of the landfill to deter ravens and other avian predators from feeding on exposed refuse. Controlled surface impoundments shall have nylon lines erected to deter avian predators.

(26) Fences will be monitored on a daily basis to control animal entrapment and mortality. Entrapped animals will be removed to avoid raven and avian predators from feeding on the prey. Results of fence monitoring will be reported to the Service and California Department of Fish and Game.

(29) The working face of the landfill shall be sized to control raven and other scavenger feeding. The working face shall be covered at the end of each working day and/or any perio of time when work at the face is stopped due to unforeseen events, i.e., weather.

Species Account

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered. In a final rule dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened. The desert tortoise is a large, herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts, and in Sonora and Sinaloa, Mexico. The threatened Mojave population is found in California, Nevada, and north of the Colorado River in Arizona and southwestern Utah. In the California deserts, desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and after infrequent summer monsoons. Desert tortoises spend the remainde of the year in burrows, escaping the extreme weather conditions of the desert.

The Service recently issued a draft recovery plan for the Mojave population of the desert tortoise (Fish and Wildlife Service 1993). This draft plan proposes the establishment of 14 Desert Wildlife Management Areas (DWMA) in six recovery units. Management in DWMAs would target the reduction or elimination of those factors which have caused declines in desert tortoise populations. The boundaries of proposed DWMAs are not precisely defined in the draft plan, but would be established by land management agencies in coordination with the Service, California Department of Fish and Game, and others. However, the proposed project does not appear to fall within any proposed DWMA.

he Service is also preparing a proposed rule to designate ritical habitat for the Mojave population of the desert ortoise. This proposed rule is scheduled to be published in the ederal Register in early September, 1993.

urther information on the range, biology, and ecology of the esert tortoise can be found in Burge (1978), Burge and Bradley 1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Turner t al. (1984), Weinstein et al. (1987), and Fish and Wildlife ervice (1993).

escription of the Environment

he project site lies in the southern Mojave desert of California ust north of Bristol Dry Lake. The southern two sections of the roject site are influenced by Bristol Dry Lake and include a road, flat saline sink characterized by occasional seasonal looding and the saltbush series of Mohave desertscrub, which ypically includes several halophytic plants such as allscale Atriplex polycarpa), four-winged saltbush (Atriplex canescens), nd inkweed (Suaeda torreyana), as well as creosote (Larrea ridentata) and bursage (Ambrosia dumosa) (Turner 1982, Rail ycle 1993). Several low hills and stabilized sand dunes occur n this southern portion. North of this seasonally flooded area he topography is flat and substrates consist primarily of loamy and and fine gravels. Perennial plants are dominated by reosote and bursage (Rail Cycle 1993). Turner (1982) described his plant community as the creosote series of Mohave esertscrub.

he entire 4,800 acre project site was surveyed for desert ortoises during February, March, May, and December, 1991 (Karl 992). Surveys consisted of walking parallel transects every 30 eet across the site (100% survey coverage) and recording all esert tortoises and sign observed. Zone of influence transects ere also conducted at 110, 220, 440, 880, 1,320, and 1,760 yards rom and parallel to the project site north of the Atchsion, opeka, and Santa Fe Railroad tracks. Only one desert tortoise ign was found on the project site - an immature carcass - which as likely carried to the site by coyotes (Karl 1992). Sign was lso encountered on the zone of influence transects, including 2 ot recently active adult desert tortoise burrows, and 2 possible urrows.

esert tortoises probably do not inhabit the project site but are ikely present in low densities in adjacent areas, at least in he northern sections (Karl 1992). Other project surveys near he Rail Cycle site, including the Mojave pipeline about two iles to the north and agricultural development about seven miles o the east, yielded similar results: little desert tortoise ign wes found (Karl 1989a; K. Fleming, pers. comm. in Karl

1992). The Bureau considers the project site as category 3 desert tortoise habitat which is characterized by low to medium densities of desert tortoises (Bureau 1992).

Analysis of the Impacts

Implementation of the proposed action would not affect desert tortoise habitat. However, because desert tortoises probably occur in adjacent areas, construction, operation, and maintenanc activities could result in a take if desert tortoises wander ont the project site. Because of very low densities, the likelihoo of encountering a desert tortoise on the site is low. Nevertheless, desert tortoises which may wander onto access roac or work areas during construction, operation, and maintenance of the landfill would be in danger of being crushed or injured by vehicles and equipment, could be collected by personnel or visitors to the area, or might be trapped in burrows collapsed b landfill activities.

Train traffic on the Atchison, Topeka, and Santa Fe Railroad would increase from 48 to 55 trains per day. Desert tortoises are probably occasionally killed on or between railroad tracks b passing trains and populations adjacent to busy tracks may be reduced (Appendix D of Fish and Wildlife Service 1993, Karl 1989b). Increased train traffic to and from the Bolo Station site could increase train-related mortality of desert tortoises.

Common ravens are efficient predators of desert tortoises (Campbell 1983, Miller 1932) and are attracted to refuse, water sources, and perching sites. The project proponents have proposed a number of mitigation features to discourage use of th landfill by ravens. Nevertheless, improperly covered refuse, or refuse uncovered by coyotes (Canis latrans); water from dust control activities, in storm water retention ponds, and other sources; trash generated on-site; and the presence of potential perching and nesting sites at the landfill could increase local populations of ravens and lead to increased predation of desert tortoises at and near the proposed landfill. Populations of other desert tortoise predators, particularly coyotes, could alsc benefit from the water and forage resources provided by the landfill.

The Service believes the effects described above will not jeopardize the continued existence of the desert tortoise. We present this conclusion for the following reasons:

1. The proponent's project description includes features to minimize take of desert tortoises and mitigate the direct and indirect impacts of the proposed action.

2 The area which would be disturbed by the project is not considered desert tortoise habitat.

Cumulative Effects

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project. Due to the extent of the lands in this area of the Mojave Desert administered by the Department of Defense and the Bureau, most of the actions which are reasonably expected to occur within the vicinity of the project site would be subject to section 7 consultations. However, some lands near the project site are privately owned and continued development of these non-Federal lands is anticipated.

The Service has contacted the counties of San Bernardino, Kern, Riverside, Inyo, and Los Angeles (and the incorporated areas within the desert) regarding the listing of the desert tortoise and its implications for county-permitted activities. Many cities within the range of the desert tortoise in San Bernardino and Los Angeles counties have expressed interest in attempting to obtain a section 10(a)(1)(B) permit from the Service. Regional planning efforts, such as the West Mojave Coordinated Management Plan, could serve as model habitat conservation plans for local governments. Cumulative impacts of future State and private projects will be addressed in regional plans, such as this, and in the section 10(a)(1)(B) permit process.

Incidental Take

Section 9 of the Act prohibits the take of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with this incidental take statement. Reasonable and prudent measures, as well as terms and conditions in this biological opinion are nondiscretionary, and must be undertaken by the agency or made a binding condition of any grant or permit, as appropriate.

Over the life of the project, this biological opinion anticipate the following forms of take:

1) Three desert tortoise in the form of direct mortality resulting from project construction, operation, and maintenance, including increased train traffic on the Atchison, Topeka, and Santa Fe Railroad.

2) Five desert tortoises in the form of direct mortality resulting from increased predator densities and elevated predation of desert tortoises.

3) Ten desert tortoises through harassment associated with excavation of active burrows or movement of desert tortoises found above ground which must be moved out of harm's way.

This biological opinion does not authorize any form of take not incidental to construction, operation, and maintenance of the Bolo Station landfill project in San Bernardino County, California. If the incidental take authorized by this opinion is met, the Bureau shall immediately notify the Service in writing. If the incidental take authorized by this opinion is exceeded, Rail Cycle or its contractors shall cease the activity resulting in the take and the Bureau shall reinitiate formal consultation with the Service.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take authorized by this biological opinion:

1. Worker education programs, defined construction areas, and well-defined operational procedures shall be implemented. Construction phase activities shall be monitored by an on-site qualified biologist(s) to avoid or minimize the take of desert tortoises.

2. Attraction of common ravens and other potential desert tortoise predators to the project area shall be reduced to the maximum extent possible.

Terms and Conditions

The following terms and conditions are established to implement the reasonable and prudent measures described above. Terms and conditions 1 through 5, 9, and 11 through 21 are taken from proponent's biological assessment (Rail Cycle 1993), but contain slight modifications or added detail.

(1) Rail Cycle shall designate a "field contact representative" (FCR) who will be responsible for overseeing compliance with these terms and conditions and for coordination of compliance with the Bureau. The FCR shall have the authority to halt all construction, operation, and maintenance activities that are in violation of terms and conditions. The FCR shall have a copy of all terms and conditions. The FCR may be a manager, any other employee, or a contracted biologist.

(2) An employee education program shall be received, reviewed, and approved by the Service at least 15 days prior to the presentation of the program. The program shall consist of a class or video presented by a qualified biologist (a knowledgeable desert tortoise biologist approved by the Bureau). Wallet-sized cards with important information for workers to carry are recommended. All employees engaged in activities which may result in a take of desert tortoise shall participate in the education program prior to initiation of work. The program shall cover the following topics at a minimum:

- distribution of the desert tortoise
- general behavior and ecology of the desert tortoise
- sensitivity to human activities
- legal protection
- penalties for violations of State and Federal law
- reporting requirements
- project terms and conditions

(3) Only biologists authorized by the Service shall handle desert tortoises. Rail Cycle or the Bureau shall submit the name(s) of the proposed authorized biologist(s) to the Service for review and approval at least 15 days prior to the onset of activities. No construction or operational activities shall begin until an authorized biologist is approved.

(4) The authorized biologist shall be required on-site during all construction phase activities (see page 2 for list of "construction phase" activities) which may result in a take of desert tortoises to monitor construction and minimize take. This biologist shall have authority from Rail Cycle to halt any action that might result in harm to a desert tortoise.

(5) Except when absolutely required by the operation, cross-country vehicle use by employees shall be prohibited during work and non-work hours.

(6) The boundaries of construction areas shall be clearly marked with flagging or stakes. All construction workers shall strictly limit their activities and vehicles to marked areas to eliminate adverse impacts to desert tortoises. All workers shall

be instructed that their activities are restricted to marked areas.

(7) Construction phase activities shall be modified, if possible, to avoid direct impacts to desert tortoises and their burrows. If a desert tortoise or its burrow is found in an are to be disturbed by construction, the qualified or authorized biologist shall work with the construction supervisor to take steps as necessary, including minor relocation of project features, to avoid damaging a burrow or disturbing a desert tortoise. For burrows outside of the actual area of disturbanc the biologist shall consider the direction the burrow runs, and that burrows may be as long as 30 feet, in determining whether not action is necessary to avoid take. Any hazards to desert tortoises that may be created, such as auger holes and trenches shall be monitored by a qualified or authorized biologist at least twice daily for desert tortoises which might become entrapped.

(8) If, throughout the project life, desert tortoises are found above ground or within burrows in areas to be disturbed by construction or operation of the landfill, it is not possible to avoid such disturbance, and the desert tortoise(s) could be injured or killed by such activities, they shall be relocated by an authorized biologist (see term and condition 3. for definition) a short distance away from the construction zone to habitat which will not be disturbed by further construction or operation activities. If construction activities are short in duration, the authorized biologist may elect to hold the desert tortoise overnight pursuant to term and condition 10 and release the animal the next day at or near the point of capture after construction activities have been completed. If the relocation occurs in the season of above-ground activity, the desert tortoise shall be placed in the mouth of a burrow of appropriate size or in the shade of a large shrub. If the relocation is not in the season of above-ground activity, the desert tortoise shal be moved on a seasonably warm day and placed at the mouth of a burrow of appropriate size. All excavation of desert tortoise burrows shall be done by hand tools, either by or under the direction of a qualified biologist. If the relocation occurs outside of the season of above-ground activity and the desert tortoise does not enter the burrow, or a burrow is not available an artificial burrow shall be constructed and the desert tortois placed within it. Artificial burrows shall be at least 6 feet i length and of the same diameter, depth, and orientation as the one in which the desert tortoise was found or as appropriate for the size of the subject desert tortoise. Wood or plastic materials may be used to strengthen the tunnel and/or chamber of the burrow. In coordination with the Service, the authorized desert tortoise biologist shall be allowed some judgement and

discretion to ensure that survival of the desert tortoise is likely.

(9) All relocated desert tortoises shall be marked for future identification. An identification number using the acrylic paint/epoxy covering technique shall be placed on the fourth left costal scute as described in the handling protocol sections of the "Protocols for Handling Live Tortoises" (Arizona Game and Fish Department et al. 1991). Slide photographs (35mm) shall be taken of the carapace, plastron, and fourth costal scute. No notching is authorized.

(10) If desert tortoise eggs are located during construction or operation and may be damaged by such activities, they shall be moved in accordance with attachment A of the general handling protocol sections of the "Protocols for Handling Live Tortoises" (Arizona Game and Fish Department et al. 1991). If desert tortoise eggs are incubated in a holding facility and the eggs hatch, the Service shall be contacted within 5 days of hatching concerning disposition of the hatchlings.

(11) Desert tortoises and their eggs shall be handled only by the authorized biologist and only when necessary. In handling desert tortoises, the authorized biologist shall follow general handling protocols (Arizona Game and Fish Department et al. 1991). New latex gloves shall be used when handling each desert tortoise to avoid the transfer of infectious diseases between animals. Replacement of lost fluids with a syringe is not authorized. If a desert tortoise needs to be moved within three hours of nightfall, or when ambient temperatures are extremely low (i.e., less than 40 degrees Fahrenheit) or high (exceeds 90 degrees Fahrenheit), it shall be placed in a clean disposable cardboard box and held overnight in a cool location. The box shall be covered and kept in possession of an authorized biologist for release of each desert tortoise the next morning in the manner described in term and condition 8. Cardboard boxes used to hold desert tortoises shall be new, used once, and discarded. All materials which come into contact with desert tortoises shall be used only once and then properly discarded to minimize contact with the causative factor(s) for URTD or other diseases.

(12) The authorized biologist shall maintain a record of all desert tortoises handled. This information shall include for each desert tortoise:

(a) the locations (narrative and maps) and dates of observations;

(b) general condition and health, including injuries and state of healing and whether animals voided their bladders;

(c) location moved from and location moved to;

(d) diagnostic markings (i.e., identification numbers or marked lateral scutes);

(e) slide photograph (35mm) of each handled desert tortoise.

(13) Prior to moving a vehicle, workers shall inspect for desert tortoises under the vehicle. If a desert tortoise is present, the authorized biologist shall carefully move or direct the movement of the vehicle only when the desert tortoise would not be injured, or the desert tortoise shall be allowed to move out from under the vehicle on its own.

(14) Rail Cycle shall participate in a cooperative raven survey with the Bureau. The survey shall be a regional study to assess the density and location of ravens within a 30-mile radius of the project site. The raven study, initiated in December, 1992, shall continue for one year prior to the startup of landfill operations. The study may be conducted up to five years following the startup of operations. Should monitoring indicate that, despite passive control measures taken at the landfill, the raven population is significantly increasing and is threatening desert tortoise populations, then the Bureau and the project proponent shall coordinate with the Service to develop further measures, including alteration of landfill operations, or any other measures necessary to eliminate the threat. The Bureau and the project proponent shall coordinate all study efforts and results through a raven monitoring control group. The control group should have representation from the Bureau, Service, California Department of Fish and Game, Rail Cycle, and any other agency representative or individual that the State and Federal agencies believe appropriate. The raven monitoring control group would oversee the raven monitoring and control program, evaluate monitoring data, and make decisions on the timing and implementation of actions to reduce raven use of the landfill.

(15) With the exception of storm water retention ponds, no ponded water shall remain on-site for more than 24 hours to avoid watering of potential desert tortoise predators. Fish-netting would be erected above all storm water retention ponds to exclude avian predators.

(16) All trash and food items shall be promptly contained within closed, raven-proof containers. The containers shall be regularly emptied and/or removed from the project site to reduce

ttractiveness of the area to ravens and other desert tortoise redators.

(17) Structures that may function as raven nesting or erching sites, such as fences and overhead power lines, shall be esigned and maintained to limit their usefulness as perches and est sites to the extent possible.

(18) Daily, intermediate, and final cover shall be aintained in accordance with CCR Title 23. The cover material hall be applied as follows:

(a) Daily cover shall consist of a 6-inch thick layer of soil or an equivalent alternative cover if permissible under the solid waste facilities permit.

(b) Intermediate cover shall be applied to all landfill waste when the area is to be left for an extended period of time (i.e., intermediate slope between cells) while landfilling operations are carried on in adjacent cells.

(c) Final cover shall be applied in accordance with the closure/post-closure requirements of the solid waste facilities permit. Beginning with cell No. 1, and following maximum filling of the cell, closure plans will be enacted. The cell shall be planted with typical native desert flora.

(19) Debris fencing and facility operations shall be esigned and installed to prevent wind-transport of trash. uring high wind periods landfilling operations shall be carried ut in wind-berm protected areas. Debris fences shall be aintained downwind from the working face to trap blowing debris. ebris fences shall be cleaned on a frequent basis, a minimum of nce daily. Debris not collected on the fences shall be policed aily or on an as needed basis to prevent cluttering of downwind reas.

(20) Nylon lines shall be erected and maintained over the orking face of the landfill to deter ravens and other avian redators from feeding on exposed refuse. Controlled surface mpoundments shall have nylon lines erected to deter avian redators.

(21) The working face of the landfill shall be sized to ontrol raven and other scavenger feeding. The working face hall be covered at the end of each working day and/or any period f time when work at the face is stopped due to unforeseen vents, such as weather.

(22) No later than 90 days following completion of the construction phase, the FCR and/or biological monitor shall submit a report to the Service's Ventura Field Office. The report shall document the effectiveness of the desert tortoise mitigation measures, the number of desert tortoises excavated from burrows, and the number of desert tortoises moved from construction sites. The report shall make recommendations for modifying or refining these terms and conditions to enhance desert tortoise protection and reduce needless hardship on the project proponent. If desert tortoises are taken after completion of the construction phase, such take shall be report to the Service pursuant to the following section.

Disposition of Dead, Injured, or Sick Desert Tortoises

Upon locating dead, injured, or sick desert tortoises, initial notification must be made to the Service's Law Enforcement Offi in Torrance, California at (310) 297-0062 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. The notification shall be sent to the Service's Torrance office with a copy to the Ventura Field Office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. If possible, the remains intact desert tortoises shall be placed with educational or research institutions holding the appropriate State and Federal permits. If such institutions are not available or the shell h been damaged, the information noted above shall be obtained and the carcass left in place. Marking the carcass in a manner tha would not be toxic to other wildlife to ensure that it would no be re-recorded in the future, should be considered.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to disposition. Injured animals should be transported to a qualified veterinarian by an authorized desert tortoise biologist. Should any treated desert tortoises survive, the Service should be contacted regarding the final disposition of the animals.

Conservation Recommendations

In furtherance of the purposes of sections 2(c) and 7(a)(1) of the Act that mandate Federal agencies to utilize their authorities to carry out programs for the conservation of liste species, we recommend implementing the following action:

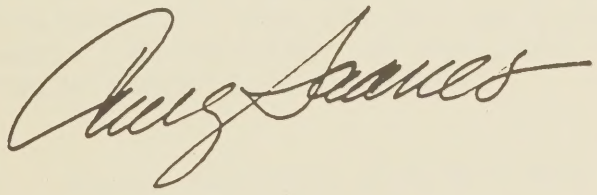
1. Rail Cycle should monitor the movements, survivorship, and condition of relocated desert tortoises to evaluate the

ffectiveness of the relocation. This information could be used o develop more successful relocation techniques.

he Service requests notification of the implementation of this onservation recommendation so we can be kept informed of actions hat either minimize or avoid adverse effects, or that benefit isted species or their habitats.

onclusion

his concludes formal consultation on the construction, peration, and maintenance of the Bolo Station Landfill Project, an Bernardino County, California. Reinitiation of formal onsultation is required if: 1) the amount or extent of ncidental take is reached; 2) new information reveals effects of he agency action that may adversely affect listed species or ritical habitat in a manner or to an extent not considered in his opinion; 3) the agency action is subsequently modified in a anner that causes an effect to a listed species or critical abitat that was not considered in this opinion; or 4) a new pecies is listed or critical habitat designated that may be ffected by this action (50 CFR 402.16). We would appreciate otification of your final decision on this matter. Any uestions or comments should be directed to Jim Rorabaugh of the entura Field Office at (805) 644-1766.



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APPENDIX E
AIR EMISSIONS DATA

TABLE F.1

VEHICLE DELAY TIMES AT RAIL CROSSINGS

STREET NAME	CROSSING/ SIGNAL TYPE	AVERAGE DAILY TRAFFIC							VEHICLE DELAY TIME PER TRAIN (Minutes)	
		PUC Baseline	Year	WPA Baseline	Year	WPA Buildout	3,000 TPD	21,000 TPD	3,000 TPD	21,000 TPD
tation to Barstow										
Rd.	1-R	62	1987	90	1988		119	142	0.3	0.4
al Trails Hwy.	9	345	1987	590	1990		709	852	2.1	2.5
al Trails Hwy.	9	234	1987				323	388	0.9	1.1
d Chase Rd.	1-R	50	1987	70	1990		84	101	0.2	0.3
al Trails Hwy.	9	116	1987				160	192	0.5	0.6
ary Rd.	9	680	1987				938	1,127	2.7	3.3
ew Rd.	9	163	1987				225	270	0.7	0.8
la Rd.	9	211	1987	770	1990		925	1,112	2.7	3.3
n Springs Rd.	9	300	1987				414	497	1.2	1.4
tt Yermo Rd.	9	2,100	1987	3,300	1991		3,788	4,551	11.3	13.7
TOTALS									22.6	27.4
w to San Bernardino/Kern County Line										
y. 58	9-A	7,900	1987				10,896	13,093	34.4	42.1
ew Rd.	9	46	1987	270	1987		372	447	1.1	1.3
y Rd.	9	600	1987	1,200	1989		1,510	1,814	4.4	5.3
la St.	1-R	81	1987				112	134	0.3	0.4
r Lake Rd.	1-R	80	1987	350	1992		384	461	1.1	1.3
Hwy. 395	9-A	2,450	1987	7,000	1991		8,034	9,654	24.8	30.2
y. 58	9	5,400	1987	9,600	1991		11,018	13,240	34.9	42.6
TOTALS									101.0	123.2
w to Victorville										
od Rd.	9	3,370	1987	7,500	1989		9,436	11,339	29.5	36.0
rove Rd.	1-R						0	0	0.0	0.0
y Rd.	9	300	1987	510	1989		642	771	1.9	2.3
d Trail Rd.	9	100	1987	310	1989		390	469	1.1	1.4
St.	9	980	1987	4,200	1989		5,284	6,350	16.0	19.4
r Rd.	1-R	30	1987	70	1990		84	101	0.2	0.3
Bryman Rd.	1-R	100	1987				138	166	0.4	0.5
Bryman Rd.	1-R	200	1987				276	331	0.8	1.0
son Ranch Rd.	1-R	100	1987				138	166	0.4	0.5
t.	9	1,000	1987	700	1990		841	1,011	2.5	3.0
St.	9	4,000	1987	2,173	1993		2,275	2,734	6.7	8.1
TOTALS									59.5	72.5
ville to San Bernardino										
out Canyon Rd.	9	100	1987	120	1988		158	190	0.5	0.6
e Rd.	9	610	1987	890	1989		1,120	1,346	3.3	4.0
Ave.	9	1,322	1987				1,823	2,191	5.4	6.5
llege Pkwy.	9	9,428	1987	9,400	1990		11,296	13,574	35.8	43.8
TOTALS									45.0	54.9
rnardino to San Bernardino/Los Angeles County Line (Pasadena Subdivision)										
o Ave.	9	9,900	1987	4,567	1993		4,782	5,746	14.4	17.5
Ave.	9	8,000	1987	8,811	1993		9,225	11,086	28.8	35.1
r Ave.	9-A	8,800	1987				12,137	14,585	38.7	47.4
ptus Ave.	9	2,000	1987	2,800	1987		3,862	4,641	11.6	14.0
a St.	9	3,000	1987	4,200	1987		5,793	6,961	17.6	21.4
ore Ave.	9	1,800	1987	6,800	1987		9,379	11,270	29.3	35.7
ide Ave.	9	12,000	1987	21,200	1987		29,239	35,136	105.1	131.1
w Ave.	9	2,000	1987	8,800	1987		12,137	14,585	38.7	47.4
Ave.	9	1,700	1987	7,300	1987		10,068	12,099	31.6	38.6
s Ave.	9	2,970	1987	8,600	1987		11,861	14,253	37.8	46.2
Ave.	8, 9	1,200	1987	8,100	1987		11,172	13,425	35.4	43.2
t Ave.	9	3,100	1987	8,700	1987		11,999	14,419	38.2	46.8
Ave.	9	5,100	1987	11,100	1987	23,000	15,309	23,000	50.0	79.3
tto Ave.	9	3,000	1987	7,600	1987		10,482	12,596	33.0	40.3
o Ave.	9	4,600	1987	7,400	1987		10,206	12,264	32.1	39.2
Ave.	8, 9	15,800	1987	25,300	1987	33,000	34,894	33,000	130.0	121.5
r Ave.	9	5,200	1987	14,100	1987		19,447	23,369	65.4	80.7
Ave.	9	4,600	1987	16,600	1987	27,000	22,895	27,000	78.8	95.6
Ave.	9	1,700	1987	7,100	1987	19,000	9,792	19,000	30.7	63.7
nda Ave.	9	4,820	1987	14,200	1987	19,000	19,585	19,000	65.9	63.7
ster Ave.	9	700	1987	4,000	1990	42,000	4,807	42,000	14.5	163.5
n Ave.	9	8,200	1987	35,600	1992	68,000	39,025	68,000	149.2	306.5
r Ave.	9	600	1987	7,000	1991	13,000	8,034	13,000	24.8	41.7
bald Ave.	9	9,000	1987	30,500	1991	35,000	35,006	35,000	130.5	130.5
an Ave.	9	1,000	1987	6,500	1990	16,000	7,811	16,000	24.1	52.5
ard Ave.	9	9,000	1987	23,600	1990	35,000	28,360	35,000	101.3	130.5
Ave.	9	1,800	1987			10,000	2,483	10,000	7.4	31.4
e Ave.	9-A	9,900	1987	15,900	1990	30,000	19,107	30,000	64.1	108.3
us Ave.	9	6,400	1987	9,000	1989		11,323	13,607	35.9	43.9
na Ave.	9	2,500	1987				3,448	4,143	10.3	12.4
d Ave.	9	30,000	1987	35,000	1991		40,171	48,272	154.7	195.1
antonio Ave.	9	6,910	1987	12,400	1991		14,232	17,102	46.1	56.6
tain Ave.	8, 9	14,600	1987	36,000	1987		49,651	59,664	202.3	257.2
on Ave.	9	3,600	1987	10,300	1987		14,206	17,071	46.0	56.4

TABLE F.1

VEHICLE DELAY TIMES AT RAIL CROSSINGS

STREET NAME	CROSSING/ SIGNAL TYPE	AVERAGE DAILY TRAFFIC							VEHICLE DELAY TIM PER TRAIN (Minutes)	
		PUC Baseline	Year	WPA Baseline	Year	WPA Buildout	3,000 TPD	21,000 TPD	3,000 TPD	21,000 T
Central Ave.	9	12,000	1987	22,600	1991		25,939	31,170	91.2	113.4
Claremont Ave.	9	2,952	1987				4,071	4,892	12.2	14.8
College Ave.	9	1,817	1987	10,000	1989		12,582	15,119	40.3	49.3
Indian Hill Blvd.	8, 9	9,500	1987	26,600	1993		27,850	33,467	99.2	123.6
TOTALS									2,167.2	2,996.(
San Bernardino to San Bernardino/Riverside County Line										
Rialto Ave.	9	12,900	1987				17,792	21,380	59.1	72.9
Walnut St.	9	500	1987	2,000	1991		2,295	2,758	6.8	8.2
Mill St. (Old)	9	1,000	1987				1,379	1,657	4.0	4.9
Laurel St.	9	1,600	1987	6,500	1987		8,965	10,773	27.9	34.0
Olive St.	9	1,900	1987	6,700	1987		9,241	11,104	28.8	35.1
E St.	9	500	1987	10,000	1987		13,792	16,573	44.5	54.6
H St.	9	1,600	1987	3,900	1987		5,379	6,464	16.3	19.8
Valley Blvd.	9	7,500	1987	11,000	1987		15,171	18,231	49.5	60.8
Main St.	1-R, 9	3,490	1987				4,813	5,784	14.5	17.6
TOTALS									251.4	307.9
San Bernardino/Los Angeles County Line, Working West										
College Ave.	9	1,817	1987	10,000	1989		12,582	15,119	40.3	49.3
Indian Hill Blvd	9	9,500	1987	26,600	1993		27,850	33,467	99.2	123.6
Cambridge Ave	9			2,600	1991		2,984	3,586	8.9	10.7
Towne Ave	9	7,961	1987	25,500	1992		27,953	33,591	99.6	124.1
Gary Ave	9	11,700	1987	23,500	1992		25,761	30,956	90.4	112.5
Fulton Road	9	178	1987	950	1990		1,142	1,372	3.4	4.0
White Ave	9	9,103	1987	15,500	1990		18,626	22,382	62.3	76.8
"E" Street	9	3,127	1987	6,400	1990		7,691	9,242	23.7	28.8
"D" Street	9	1,477	1987	8,000	1990		9,613	11,552	30.1	36.7
"A" Street	9	1,295	1987	560	1990		673	809	2.0	2.4
San Dimas Canyon Road	9	577	1987	6,400	1988		8,431	10,131	26.2	31.8
Walnut Ave	9	2,600	1987	2,600	1988		3,425	4,116	10.2	12.3
San Dimas Ave	9	3,000	1987	8,200	1988		10,802	12,980	34.1	41.7
Monte Vista Ave	9	983	1987	1,300	1988		1,712	2,058	5.0	6.1
Cataract Ave	9	7,000	1987	2,500	1988		3,293	3,957	9.8	11.9
Eucla Ave	9	784	1987	6,900	1988		9,089	10,922	28.3	34.5
210 Fwy	Overpass						0	0	0.0	0.0
Gladstone Ave	9	3,000	1987	6,900	1988		9,089	10,922	28.3	34.5
Lone Hill Ave	9	2,100	1987	17,200	1992		18,855	22,657	63.1	77.9
210 Fwy	Overpass						0	0	0.0	0.0
Foothill Blvd	Underpass						0	0	0.0	0.0
Loraine Ave	9	3,500	1987	4,400	1991		5,050	6,068	15.3	18.5
Elwood Ave	9	750	1987				1,034	1,243	3.0	3.6
Glenwood Ave	9	750	1987				1,034	1,243	3.0	3.6
Pasadena Ave	9	500	1987				690	829	2.0	2.4
Glendora Ave	9	7,373	1987	16,500	1992		18,087	21,735	60.2	74.2
Vermont Ave	9	1,200	1987	4,100	1987		5,655	6,795	17.2	20.8
Foothill Blvd	9	22,000	1987	14,200	1991		16,298	19,585	53.6	65.9
Grand Ave	9	22,000	1987	16,400	1991		18,823	22,619	63.0	77.7
Barranca Ave	9	5,400	1987	9,000	1991		10,330	12,413	32.5	39.7
Pasadena Ave	9	2,976	1987	3,600	1991		4,132	4,965	12.4	15.0
Dalton Ave	9	615	1987				848	1,019	2.5	3.0
Alameda Ave	9	900	1987				1,241	1,492	3.6	4.4
Azusa Ave	9	6,100	1987	8,800	1991		10,100	12,137	31.7	38.7
San Gaberial Ave	9	6,100	1987	9,000	1991		10,330	12,413	32.5	39.7
Foothill Blvd	Underpass						0	0	0.0	0.0
Virginia Ave	9	4,732	1987				6,526	7,843	20.0	24.2
210 Fwy	Underpass						0	0	0.0	0.0
Irwindale Ave	Overpass						0	0	0.0	0.0
TOTALS									1,017.4	1,251.0
Riverside County Line, Working West										
Main St	9	1,000	1987	2,800	1991		3,214	3,862	9.6	11.6
Center St	9	3,500	1987	5,000	1991		5,739	6,896	17.4	21.1
Iowa St	9	7,840	1987				10,813	12,994	34.2	41.7
Palmyrita Ave	9	750	1987	1,300	1986		1,877	2,256	5.5	6.7
Colombia Ave	9	5,470	1987	9,700	1988		12,778	15,355	40.9	50.1
Marlborough Ave	9	518	1987	1,700	1989		2,139	2,570	6.3	7.6
I 215 Fwy	Overpass						0	0	0.0	0.0
Spruce St	9	1,883	1987	4,800	1986		6,931	8,329	21.3	25.8
Kansas Ave	9	5,024	1987	4,500	1986		6,498	7,809	19.9	24.1
3rd St	9	5,040	1987	9,700	1986		14,007	16,832	45.3	55.6
7th St	9	2,660	1987	4,100	1988		5,401	6,490	16.4	19.8
University	Underpass						0	0	0.0	0.0
10th St	9	930	1987				1,283	1,541	3.8	4.5
12th Ave	9						0	0	0.0	0.0
14th St	Underpass						0	0	0.0	0.0
Prospect Ave	9	3,170	1987				4,372	5,254	13.1	15.9
Cridge St	9	4,100	1987	6,500	1990		7,811	9,386	24.1	29.3
Ivy St	Overpass						0	0	0.0	0.0

TABLE F.1

VEHICLE DELAY TIMES AT RAIL CROSSINGS

STREET NAME	CROSSING/ SIGNAL TYPE	AVERAGE DAILY TRAFFIC							VEHICLE DELAY TIME PER TRAIN (Minutes)	
		PUC Baseline	Year	WPA Baseline	Year	WPA Buildout	3,000 TPD	21,000 TPD	3,000 TPD	21,000 TPD
l Ave	Underpass						0	0	0.0	0.0
on Ave	9	13,100	1987	32,603	1993		34,135	41,020	126.6	158.8
	9	1,540	1987	3,300	1989		4,152	4,989	12.5	15.1
it	9	4,900	1987	10,800	1991		12,395	14,895	39.6	48.5
gton St	9	5,356	1987	5,700	1992		6,248	7,509	19.1	23.1
n St	9	7,500	1987	8,900	1991		10,215	12,275	32.1	39.2
on St	9	1,864	1987	8,000	1989		10,065	12,095	31.6	38.6
St	1r	2,000	1987	11,300	1993		11,831	14,217	37.6	46.0
e St	Underpass						0	0	0.0	0.0
n St	1r	499	1987	6,700	1993		7,015	8,430	21.5	26.2
St	9	360	1987				497	597	1.4	1.7
ren Blvd	Underpass						0	0	0.0	0.0
n St	9	1,950	1987				2,689	3,232	8.0	9.6
t	9	1,380	1987				1,903	2,287	5.6	6.8
ria Ave	Overpass						0	0	0.0	0.0
e St	1r						0	0	0.0	0.0
St	9	820	1987				1,131	1,359	3.3	4.0
nan St	9	190	1987				262	315	0.8	0.9
lia Ave	9	11,765	1987	15,600	1993		16,333	19,627	53.7	66.1
ley St	9	6,550	1987	20,500	1991		23,528	28,274	81.4	100.9
lge Ave	9	228	1987				314	378	0.9	1.1
wy	Overpass						0	0	0.0	0.0
tt 91 Fwy	Overpass						0	0	0.0	0.0
	9	2,054	1987				2,833	3,404	8.4	10.2
it	Overpass						0	0	0.0	0.0
an St	9	1,013	1987				1,397	1,679	4.1	4.9
t	9	1,097	1987				1,513	1,818	4.4	5.4
n Ave	Overpass						0	0	0.0	0.0
ad St	1r			10,000	1992		10,962	13,173	34.7	42.3
St	9	1,726	1987	12,000	1992		13,155	15,807	42.3	51.8
Club Dr	9						0	0	0.0	0.0
tt 91 Fwy	Overpass						0	0	0.0	0.0
tt 91 Fwy	Overpass						0	0	0.0	0.0
dge Dr	Overpass						0	0	0.0	0.0
TOTALS									827.4	1,015.0
Riverside County Line, Begin Orange County										
o De Bryan	Underpass						0	0	0.0	0.0
mas De Yorba East	Overpass						0	0	0.0	0.0
mas De Yorba East	Underpass						0	0	0.0	0.0
Canyon Road	Overpass						0	0	0.0	0.0
al Hwy	9	14,000	1987	42,000	1992	87,000	46,041	87,000	183.7	431.1
g Dr	9			7,000	1992	8,000	7,673	8,000	23.7	24.7
iew Ave	9	1,000	1987	22,000	1992	37,000	24,117	37,000	83.7	139.7
eld Rd	9	3,000	1987	5,000	1987	15,000	6,896	15,000	21.1	48.9
uren St	9	2,000	1987				2,758	3,315	8.2	9.9
on St	9	4,000	1987	4,000	1987	9,000	5,517	9,000	16.7	28.0
Ave	9	6,000	1987	21,000	1987	37,000	28,963	37,000	103.9	139.7
ethorpe Ave	9	8,000	1987	26,000	1987	50,000	35,859	50,000	134.4	204.1
r Blvd	9	9,000	1987	23,000	1987	44,000	31,722	44,000	115.8	173.4
rd Ave	9	4,000	1987	5,000	1987	11,000	6,896	11,000	21.1	34.8
se St	9	3,000	1987	5,000	1987	9,000	6,896	9,000	21.1	28.0
Rt 57 Fwy	Overpass						0	0	0.0	0.0
tia Ave	9	10,000	1987	16,735	1993	28,000	17,522	28,000	58.1	99.8
College Blvd	9	27,000	1987	20,168	1993	32,000	21,116	32,000	71.8	117.1
a St	9	5,000	1987	7,000	1987	13,000	9,654	13,000	30.2	41.7
ond Ave	9	14,950	1987	21,000	1987	27,000	28,963	27,000	103.9	95.6
n St	Underpass						0	0	0.0	0.0
r Blvd	Underpass						0	0	0.0	0.0
nd Ave	9	8,400	1987	7,000	1987	8,000	9,654	8,000	30.2	24.7
l Ave	Underpass						0	0	0.0	0.0
onwealth Ave	Underpass	15,000	1987	16,000	1987	23,000	22,067	23,000	75.6	79.3
hurst Rd	9			23,000	1987	25,000	31,722	25,000	115.8	87.3
Gilbert Ave	Underpass						0	0	0.0	0.0
St	9	12,000	1987				16,550	19,888	54.5	67.1
TOTALS									1,273.5	1,874.9
Orange County Line, Begin Los Angeles County										
Blvd	Underpass						0	0	0.0	0.0
ra Blvd	Overpass						0	0	0.0	0.0
y View Ave	9	18,000	1987	34,500	1988		45,446	54,612	180.7	228.9
rans Blvd	9	17,000	1987	19,800	1988		26,082	31,342	91.8	114.2
uardt Ave	9						0	0	0.0	0.0
enita Rd	Underpass						0	0	0.0	0.0
ial Hwy	Underpass						0	0	0.0	0.0
and Rd	9	4,700	1987	2,600	1988		3,425	4,116	10.2	12.3
ace Ave	Underpass						0	0	0.0	0.0
raph Rd	Underpass						0	0	0.0	0.0
Fe Springs Rd	Underpass						0	0	0.0	0.0

TABLE F.1

VEHICLE DELAY TIMES AT RAIL CROSSINGS

STREET NAME	CROSSING/ SIGNAL TYPE	AVERAGE DAILY TRAFFIC							VEHICLE DELAY TIM PER TRAIN (Minutes)	
		PUC Baseline	Year	WPA Baseline	Year	WPA Buildout	3,000 TPD	21,000 TPD	3,000 TPD	21,000 T
Los Nietos Rd	9			7,200	1992		7,893	9,484	24.4	29.7
Norwalk Blvd	9	17,600	1987	18,900	1992		20,718	24,897	70.3	86.9
Pioneer Blvd	9	11,000	1987	12,905	1993		13,512	16,236	43.5	53.4
605 Fwy	Overpass						0	0	0.0	0.0
Slauson Ave	Overpass						0	0	0.0	0.0
Passons Blvd	9	9,300	1987	12,300	1989		15,475	18,596	50.6	62.1
Serapis St	9	4,600	1987	7,300	1989		9,185	11,037	28.7	34.9
Rosemead Blvd	Underpass						0	0	0.0	0.0
Paramount Blvd	Underpass						0	0	0.0	0.0
Greenwood Ave	Underpass						0	0	0.0	0.0
Garfield Ave	Underpass						0	0	0.0	0.0
Telegraph Road	Underpass						0	0	0.0	0.0
I 5 Fwy	Underpass						0	0	0.0	0.0
Eastern Ave	Underpass						0	0	0.0	0.0
Atlantic Blvd	Underpass						0	0	0.0	0.0
TOTALS									500.2	622.4
Mojave District -- Begin Saugus Line Road Crossings										
I5/State 14 Interchange	OVERPASS						0	0	0.0	0.0
Balboa Blvd	OVERPASS						0	0	0.0	0.0
Weldon Canyon Rd	OVERPASS						0	0	0.0	0.0
San Fernando Rd	8A	5,000	1987				6,896	8,287	21.1	25.7
Market St	9	200	1987				276	331	0.8	1.0
13th St	9	150	1987				207	249	0.6	0.7
Shawna	9	300	1987				414	497	1.2	1.4
Drayton St	9	150	1987				207	249	0.6	0.7
Squib St							0	0	0.0	0.0
Golden Oak Rd	9	300	1987				414	497	1.2	1.4
Hope Way							0	0	0.0	0.0
Rainbow Glen Dr							0	0	0.0	0.0
Whites Canyon Rd							0	0	0.0	0.0
Sierra Hwy	OVERPASS						0	0	0.0	0.0
State 14 Fwy	OVERPASS						0	0	0.0	0.0
Sand Canyon Rd	OVERPASS						0	0	0.0	0.0
Oak Spring Canyon Rd							0	0	0.0	0.0
Lang Station Rd	8	20	1987				28	33	0.1	0.1
Soledad Canyon Rd	OVERPASS						0	0	0.0	0.0
Soledad Canyon Rd	OVERPASS						0	0	0.0	0.0
Boot Legger Canyon Rd	1R	20	1987				28	33	0.1	0.1
Crown Valley Rd	9	300	1987				414	497	1.2	1.4
Arrastre Canyon Rd							0	0	0.0	0.0
Crown Valley Rd	9	350	1987				483	580	1.4	1.7
Michigan St							0	0	0.0	0.0
Ohio St							0	0	0.0	0.0
Indiana St							0	0	0.0	0.0
Illinois St							0	0	0.0	0.0
Aliso Canyon Rd	9	75	1987				103	124	0.3	0.4
Angeles Forrest Hwy							0	0	0.0	0.0
Old Nadeau Rd							0	0	0.0	0.0
Pear Blossom Hwy	OVERPASS						0	0	0.0	0.0
Sierra Hwy	9	8,000	1987				11,034	13,259	34.9	42.6
Barrel Springs Rd	9	150	1987				207	249	0.6	0.7
Ave S	9	1,560	1987				2,152	2,585	6.4	7.7
TOTALS									70.5	85.6
Mojave District -- Begin Bakersfield Line Road Crossings										
Ave R	9	3,000	1987				4,138	4,972	12.4	15.0
Palmdale Blvd	9/8	6,000	1987				8,275	9,944	25.6	31.2
Ave Q							0	0	0.0	0.0
Sierra Hwy	9/8	10,000	1987				13,792	16,573	44.5	54.6
Ave P	9	8,000	1987				11,034	13,259	34.9	42.6
Ave M	9	2,000	1987				2,758	3,315	8.2	9.9
Ave K	9	3,000	1987				4,138	4,972	12.4	15.0
Ave J	9/8	10,000	1987				13,792	16,573	44.5	54.6
Lancaster Blvd	9/8	10,000	1987				13,792	16,573	44.5	54.6
Ave I	9	10,000	1987				13,792	16,573	44.5	54.6
Ave G	9	100	1987				138	166	0.4	0.5
Ave E	9	75	1987				103	124	0.3	0.4
Ave C	1	100	1987				138	166	0.4	0.5
Ave A (Kern County Line)	9	75	1987				103	124	0.3	0.4
Gaskell Rd							0	0	0.0	0.0
Marie Ave							0	0	0.0	0.0
Rosamond Springs Rd	9	5,700	1987				7,861	9,447	24.3	29.5
Reed Ave							0	0	0.0	0.0
Purdy Ave	9A	390	1987				538	646	1.6	1.9
Oak Creek Rd	9	4,000	1987				5,517	6,629	16.7	20.3
TOTALS									315.5	385.6

TABLE F.2

EMISSIONS DATA FOR TRUCKS AND LOCOMOTIVES USED IN NO ACTION ALTERNATIVE ANALYSIS

EMISSION SOURCE	TRAVEL DISTANCE miles/trip	SOLID WASTE tons/day	TRUCK CAPACITY tons	OPERATING TIME		EMISSION FACTORS					UNITS	REFERENCE
				trips/day	days/year	RHC	NOx	SO2	CO	TSP		
REFINED 3,000 TPD SCENARIO												
9-TON PACKER TRUCKS	45	0	8.73	0	312	2.3	12.18	0.44	7.94	3.17	g/mile	EMFAC7EP,35 MPH,HDDV,1994;SO2 = (SCAQMD 1993)
TRANSFER TRUCKS	90	0	20	0	312	2.3	12.18	0.44	7.94	3.17	g/mile	EMFAC7EP,35 MPH,HDDV,1994;SO2 = (SCAQMD 1993)
REFINED 21,000 TPD SCENARIO												
9-TON PACKER TRUCKS	45	4500	8.73	516	312	2.09	10.75	0.32	7.69	2.36	g/mile	EMFAC7EP,35 MPH,HDDV,1998;SO2 = (SCAQMD 1993)
TRANSFER TRUCKS	90	10500	20	526	312	2.09	10.75	0.32	7.69	2.36	g/mile	EMFAC7EP,35 MPH,HDDV,1998;SO2 = (SCAQMD 1993)

EMISSION SOURCE	WORST DAY EMISSION (lbs/day)					ANNUAL EMISSION (tons/yr)					REMARKS
	RHC	NOx	SO2	CO	TSP	RHC	NOx	SO2	CO	TSP	
TRUCK EMISSIONS:											
REFINED 3,000 TPD SCENARIO											
9-TON PACKER TRUCKS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9-TON TRUCKS, REVISED E.F.'S, 45 MI R/T,70% OF WASTE
TRANSFER TRUCKS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	TRANSFER TRUCKS,REVISED E.F.'S, 90 MI R/T,30% OF WASTE
SUBTOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
REFINED 21,000 TPD SCENARIO											
9-TON PACKER TRUCKS	106.99	550.30	16.38	393.65	120.81	16.69	85.85	2.56	61.41	18.85	9-TON TRUCKS, REVISED E.F.'S, 45 MI R/T,70% OF WASTE
TRANSFER TRUCKS	218.12	1121.92	33.40	802.57	246.30	34.03	175.02	5.21	125.20	38.42	TRANSFER TRUCKS,REVISED E.F.'S, 90 MI R/T,30% OF WASTE
SUBTOTAL	325.11	1672.22	49.78	1196.22	367.11	50.72	260.87	7.77	186.61	57.27	
3,000 TPD TRAIN EMISSIONS (Proposed Action & No Action Alternative)											
3,000 TPD TRAINS-SCAB	32.36	910.84	65.16	111.56	19.24	5.05	142.09	10.16	17.4	3	BASED ON RAIL•CYCLE TRAIN EMISSIONS DATA
3,000 TPD TRAINS-SEDAB	36.93	931.37	66.32	125.58	20.08	5.76	145.29	10.35	19.59	3.13	BASED ON RAIL•CYCLE TRAIN EMISSIONS DATA
21,000 TPD TRAIN EMISSIONS (Proposed Action)											
21,000 TPD TRAINS-SCAB	161.8	4554.2	325.8	557.8	96.2	25.25	710.45	50.8	87	15	ASSUMES FIVE TRAINS IN SCAB
21,000 TPD TRAINS-SEDAB	258.51	6519.59	464.24	879.06	140.56	40.32	1017.03	72.45	137.13	21.91	ASSUMES SEVEN TRAINS IN SEDAB
(No Action Alternative)											
21,000 TPD TRAINS-SCAB	64.72	1821.68	130.32	223.12	38.48	10.1	284.18	20.32	34.8	6	ASSUMES TWO TRAINS IN SCAB
21,000 TPD TRAINS-SEDAB	73.86	1862.74	132.64	251.16	40.16	11.52	290.58	20.7	39.18	6.26	ASSUMES TWO TRAINS IN SEDAB

APPENDIX F
TRAFFIC CALCULATIONS

WPA Traffic Engineering, Inc.
TRAFFIC & TRANSPORTATION ENGINEERING

June 17, 1993

Mr. Robert C. Mason
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Dear Mr. Mason:

This letter presents analyses of traffic factors related to the Rail-Cycle - Bolo Station Landfill Project. This study is based upon information provided by you, field studies conducted by our staff, and standard traffic engineering principles.

INTRODUCTION

The relationship between railroad crossings and their potential traffic impacts on the crossing streets are relatively unique, as standard analysis methodologies are not available. In part, analyses are difficult due to many variables, including speed of train, length of train, volumes of street traffic, and number of traffic lanes.

With respect to this project, an added factor is the number of railroad crossings which will be utilized by the proposed project related trains. Given the magnitude of the number of crossings, it was necessary to develop a system for analyzing potential impacts under various situations. Potential traffic delays also needed to be quantified in order to complete the air quality analyses. The following analyses are based upon information provided by you, field studies conducted by our staff, and standard traffic engineering principles.

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EXISTING CONDITIONS

The proposed project involves train travel through various counties in Southern California and their numerous railroad crossings. The Public Utilities Commission (PUC) provided various data related to each railroad crossing, which included daily traffic volumes for the streets crossing the tracks. In an effort to supplement and update the PUC volumes, WPA Traffic Engineering, Inc. conducted research of the counties and cities along the proposed train routes to obtain available traffic volume information. The results of these efforts are summarized in Appendix A of this study.

In addition, field studies of nine existing railroad crossing locations were conducted. The data collected included 24-hour counts on the streets at the railroad tracks, manual measurements of the time required for trains (including the gate times) to pass, and vehicle queue characteristics during their crossings.

The study locations included three in San Bernardino County, three in Riverside County, two in Orange County, and one in Los Angeles County, with daily traffic volumes ranging from 4,600 to 32,600. The manual counts were taken from 7:30 PM to 11:00 PM, when street traffic is highest given the proposed train operations between 8:00 PM and 6:00 AM. The general study locations are illustrated on Figure 1.

TRAFFIC ANALYSES

There was an interest in evaluating the delays to traffic due to the proposed rail crossings/project trains, to evaluate the traffic as well as the air quality impacts. The first step was to determine the length of time that traffic would be stopped due to the project related trains. The WPA studies at the nine locations included the measurement of existing train crossing times.

The time that traffic would be stopped included the warning prior to the train (gates come down), the train passing time, and a warning period after the train has passed. Measurement of the total time that vehicles on the street were required to be stopped

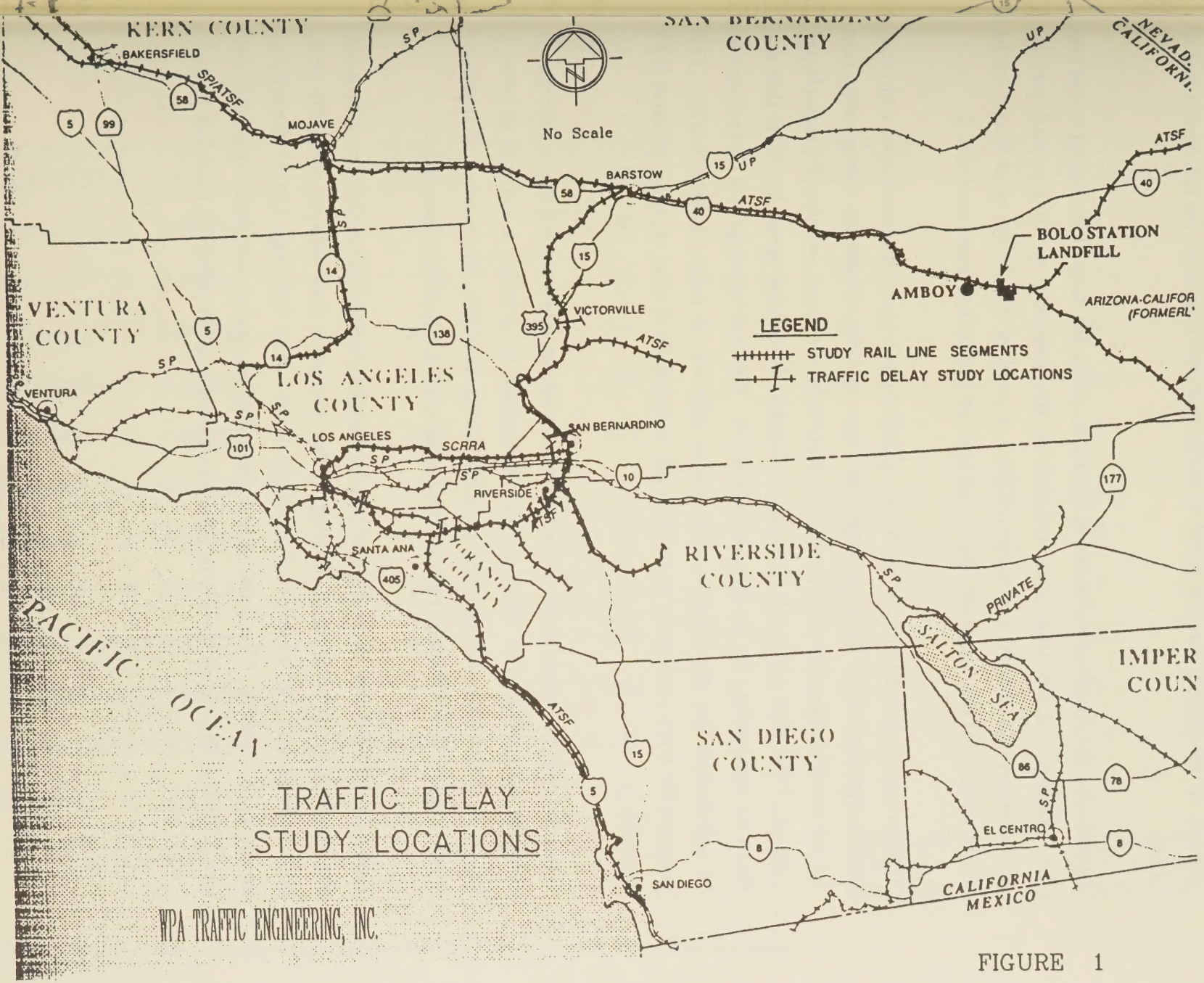
KERN COUNTY
BAKERSFIELD
SP/ATSF
MOJAVE
No Scale
SAN BERNARDINO COUNTY
UP
NEVAD.
CALIFORN.
ATSF
BARSTOW
BOLO STATION LANDFILL
AMBOY
ARIZONA-CALIFOR
(FORMERL'
VICTORVILLE
LEGEND
STUDY RAIL LINE SEGMENTS
TRAFFIC DELAY STUDY LOCATIONS
VENTURA COUNTY
LOS ANGELES COUNTY
VENTURA
LOS ANGELES
SCRRA
SAN BERNARDINO
RIVERSIDE
SANTA ANA
RIVERSIDE COUNTY
PRIVATE
SALTON SEA
IMPER
COUN
PACIFIC OCEAN
SAN DIEGO COUNTY
EL CENTRO
SAN DIEGO
CALIFORNIA
MEXICO
TRAFFIC DELAY
STUDY LOCATIONS
WPA TRAFFIC ENGINEERING, INC.

FIGURE 1

and the number of train cars were observed during the 7:30 PM to 11:00 PM study period. It was found that the speed of trains and warning times varied from train to train.

In addition, the length of trains varied from two cars to 101 cars. The shorter trains and the passenger trains were not included in the analyses, as they would not be representative of the 60 car project train. A total of 12 trains were found to be representative of the proposed operations and the results are listed in Table 1.

The average crossing time per train car ranged from 1.4 to 3.4 seconds per train car, with an average rate of 2.2 seconds per train car. In order to select a conservative rate for use in the analyses, the 85th percentile observation was used, which is 3.0 seconds per train car. The 85th percentile is a value utilized in developing speed limits, so that the limits are appropriate for the majority of drivers. This methodology was determined to be appropriate for providing a conservative estimate of train crossing times. The proposed 60 train cars would result in traffic stopped for a total of three minutes (180 seconds).

Given the time required for the project trains to cross the study streets, the vehicle delays could be addressed. The delay analysis is required to consider a number of factors, including the volume of traffic, the potential queue of traffic, the number of approach lanes, and the time required to cross the tracks once the train has passed by.

Based on the field data collected and standard traffic engineering principles, a formula was developed which results in "Average Delay" per peak hour vehicle, given the peak hour volume and the number of approach lanes. The "Average Delay" formula is presented in Table 2. The formula is divided into two parts; the delay related to the train crossing and the delay due to vehicles starting to move after the train has passed.

TRAIN CROSSING TIME SURVEY

LOCATION / (COUNTY) /	TIME OF DAY	TRAIN CROSSING TIME [a] IN MIN.	IN SEC.	NUMBER OF TRAINS	AVERAGE CROSSING TIME PER TRAIN CAR (SEC.)
Riverside	8:00 PM	2:24	144	101	1.4
Orange	8:49 PM	1:40	100	67	1.5
Los Angeles	9:03 PM	2:34	154	56	2.8
Los Angeles	9:40 PM	3:30	210	91	3.0
Riverside	7:35 PM	3:07	187	73	2.6
Riverside	8:24 PM	2:19	139	78	1.8
Riverside	8:55 PM	1:13	73	47	1.6
Riverside	10:24 PM	2:03	123	57	2.2
San Bernardino	8:02 PM	4:06	246	72	3.4
San Bernardino	9:22 PM	3:58	238	75	3.2
San Bernardino	9:52 PM	2:01	121	70	1.7
Riverside	8:52 PM	1:07	67	48	1.4
				AVERAGE	2.2 Seconds
				RANGE	1.4 - 3.4 Seconds
				85th PERCENTILE	3.0 Seconds

(a) Includes the warning time both before the train arrives and after it leaves.

TABLE 2

AVERAGE DELAY FORMULA

$$\text{AVERAGE DELAY (Per Peak Hour Vehicle)} = \left(\frac{\text{Time Gates Down}^{(a)}}{\text{One Hour}} \times \text{Peak Hour}^{(a)}\ \text{Volume} \times \frac{\text{Time Gates Down}^{(b)}}{2} \right)^{(c)}$$

$$+ \left(\frac{0.6^{(d)} \times \dfrac{\text{Time Gates Down}^{(a)}}{\text{One Hour}} \times \text{Peak Hour}^{(a)}\ \text{Volume}}{\text{Approach Lane Factor}^{(e)}\ \text{(in seconds)}} + 1^{(f)} \right)^{(g)} \times \left(\frac{\text{Time Gates Down}}{\text{One Hour}} \times \text{Peak Hour Volume} \right)^{(h)}$$

Based on the project train of 60 cars and assuming the 85 percentile train crossing rate, a crossing time (including gates down) of 3 minutes or 180 seconds is found:

$$\text{AVERAGE DELAY FORMULA (Project Train)} = \left(\frac{3\ \text{Min.}}{60\ \text{Min.}} \times \text{Peak Hour Volume} \times \frac{180\ \text{Sec.}}{2} \right) + \left(\frac{0.6 \times \dfrac{3\ \text{Min.}}{60\ \text{Min.}} \times \text{Peak Hour Volume}}{\text{Approach Lane Factor}} + 1 \right) \left(\frac{3\ \text{Min.}}{60\ \text{Min.}} \times \text{Peak Hr Vol.} \right)$$

$$= \left(4.5\ \text{Sec.} \times \text{Peak Hour Volume} \right) + \left(0.03 \times \frac{\text{Peak Hour Volume}}{\text{Approach Lane Factor}} + 1 \right) \left(0.05 \times \text{Peak Hour Volume} \right) \text{Sec.}$$

(a) Represents the average number of vehicles expected to be stopped at the railroad crossing due to the train. Accounts for traffic in both directions (approaches).

(b) Assumes vehicles will arrive at the tracks randomly and over a large number of samples, the arrivals will be generally even throughout the hour.

(c) This factor represents the total waiting time of vehicles stopped at the rail crossing while the gates are down/train is crossing.

(d) Usually the volume of traffic in one direction is higher than the other direction. A widely used assumption is that traffic is split 60% in one direction and 40% in the other direction. This factor incorporates these percentages.

(e) If two or three approach lanes are available, often traffic will not distribute evenly. The approach lane factors used were 1.0, 1.67, and 2.5 for one, two, and three lane approaches, respectively.

(f) Research has shown that the time required to clear a line of vehicles in a queue is generally two seconds per vehicle. Another way to express this is a lane capacity of 1800 vehicles per hour, which is very representative of in the field operations. Utilizing this data, it was found that the average time (in seconds) for each vehicle in the queue to cross the railroad tracks equals the number of vehicles in the queue plus one.

(g) This portion of the equation examines the lane with the longest queue in the direction that has the most vehicles. It provides a factor to calculate the average delay per vehicle (in the longest queue), once the vehicles begin to cross the tracks, after the train passes.

(h) This provides the number of vehicles (both directions and all lanes) which are waiting when the vehicles begin to cross the tracks. Obviously, this results in a "worst case" evaluation, since maximum average delay (longest queue) is applied to all vehicle queues (including the short queues).

Some assumptions were required in developing the formula, which are supported by the field studies conducted by WPA:

1) It is assumed that vehicles will arrive randomly at the train crossing; and for a large number of samples, the arrivals will be generally even throughout any hour. Therefore, the number of vehicles stopped (queued) by a train crossing is a direct function of the train crossing time and the number of peak hour vehicles. Table 3 shows a comparison of field measured queues to the assumed queues using the study methodology. The comparison shows that the study methodology is appropriate.

2) Generally, traffic is not split evenly in both directions. A widely recognized assumption for peak hour traffic is that the split of traffic is 60% in one direction and 40% in the other. During the off-peak hours, the split is generally more evenly split than the peak hour. Table 4 shows the field measured traffic splits at the nine study locations. The field studies (average 57/43 split) indicate that the 60/40 split used in the formula results in a conservative analysis.

3) Table 4 also presents a comparison of the observed peak hour (8:00 - 9:00 PM given the proposed train operations of 8:00 PM to 6:00 AM) percentages at the nine study locations, to the calculated peak hour percentages. The calculated peak hour percentages are based on County of Los Angeles data and appear to be representative of the study locations. The hourly percentages throughout the day are also provided in Table 4.

4) When two or three approach lanes are available, traffic often does not split evenly. To account for this, an approximate 20 percent increase was assumed for one of the lanes. For a two lane approach, the traffic was split 60% and 40%; and for a three lane approach, the split was 40%, 30%, and 30%. As a comparison, these splits are more conservative than the

TABLE 3

QUEUE LENGTH COMPARISON

LOCATION	TIME OF / DAY	FIELD STUDY: ACTUAL NUMBER OF VEHICLES IN QUEUE (TOTAL)	FIELD STUDY: PEAK HOUR VOLUME	FIELD STUDY: TRAIN CROSSING TIME (TOTAL)	CALCULATED QUEUE: CROSSING TIME X PEAK HR VOL ONE HR	ACTUAL VS. CALCULATED QUEUE (0) IS THE SAME (+) CALC. IS CONSERVATIVE (-) CALC. IS LOWER
Rialto Ave.	/ 8:02 PM	29	390	4:06	27	-
	/ 9:18 PM	1	302	0:49	4	+
	/ 10:46 PM	1	172	1:04	3	+
Rancho Ave.	/ 10:47 PM	2	158	1:44	4	+
Sixth St.	/ 9:22 PM	2	72	3:58	5	+
	/ 9:52 PM	1	72	2:01	2	+
Jackson St.	/ 7:35 PM	7	249	3:07	13	+
	/ 8:24 PM	8	213	2:19	8	0
	/ 8:55 PM	4	213	1:13	4	0
	/ 10:09 PM	2	50	1:00	1	-
	/ 10:24 PM	3	50	2:03	2	-
Adams St.	/ 7:58 PM	7	542	0:35	5	-
	/ 8:52 PM	2	369	1:07	7	+
Arlington Ave.	/ 8:00 PM	45	1,401	2:24	56	+
	/ 8:45 PM	45	1,401	1:45	41	-
	/ 10:18 PM	18	763	1:20	17	-
Placentia Ave.	/ 7:30 PM	27	702	1:15	15	-
	/ 8:05 PM	17	444	1:18	10	-

QUEUE LENGTH COMPARISON

LOCATION	TIME OF / DAY	FIELD STUDY: ACTUAL NUMBER OF VEHICLES IN QUEUE (TOTAL)	FIELD STUDY: PEAK HOUR VOLUME	FIELD STUDY: TRAIN CROSSING TIME (TOTAL)	CALCULATED QUEUE: CROSSING TIME ONE HR X PEAK HR VOL	ACTUAL VS. CALCULATED QUEUE (0) IS THE SAME (+) CALC. IS CONSERVATIVE (-) CALC. IS LOWER
State College	/ 8:49 PM	17	709	1:40	20	+
	/ 10:30 PM	1	339	0:33	3	+
Pioneer Blvd.	/ 7:50 PM	9	592	0:57	9	0
	/ 8:15 PM	11	528	1:33	14	+
	/ 9:03 PM	20	421	2:34	18	-
	/ 9:21 PM	13	421	1:10	8	-
	/ 9:26 PM	7	421	1:13	9	+
	/ 9:40 PM	17	421	3:30	25	+
	/ 10:05 PM	11	274	1:59	9	-
	/ 10:42 PM	5	274	1:01	5	0
					TOTALS	13 +
						11 -
						4 0

CONCLUSION: The "CALCULATED QUEUE" is a reasonable estimate of actual queues that would be found in the field.

TABLE 4

COMPARISON OF FIELD COUNTS
TO THE ASSUMPTIONS UTILIZED

LOCATION (COUNTY)	ASSUMED 60-40 DIRECTIONAL SPLIT OF TRAFFIC FIELD STUDY, 8 - 9 PM SPLIT	8 - 9 PM PK = 3.79% OF ADT COUNTY OF LOS ANGELES DATA[a] FIELD STUDY, 8 - 9 PM PERCENT OF ADT
Rialto Ave. (San Bernardino)	53 - 47	4.43%
Rancho Ave. (San Bernardino)	51 - 49	5.71%
Sixth St. (San Bernardino)	56 - 44	3.13%
Jackson St. (Riverside)	56 - 44	3.16%
Adams St. (Riverside)	59 - 41	3.28%
Arlington Ave. (Riverside)	59 - 41	4.29%
Placentia Ave. (Orange)	64 - 36	2.65%
State College Blvd. (Orange)	58 - 42	3.52%
Pioneer Blvd. (Los Angeles)	57 - 43	4.09%
	AVERAGE 57 - 43	3.81%

(a) The County of Los Angeles has Year 1991 peak hour percentages as a function of Average Daily Traffic (ADT). These factors are presented to allow conversion of daily volumes to any desired peak hour volume. The 8-9 PM hour was selected for use as it represents the highest traffic hour during the proposed train operations of 8:00 PM - 6:00 AM.

TIME	PERCENTAGE OF ADT	TIME	PERCENTAGE OF ADT
Midnight - 1:00 AM	0.79%	Noon - 1:00 PM	5.94%
1:00 AM - 2:00 AM	0.45%	1:00 PM - 2:00 PM	6.00%
2:00 AM - 3:00 AM	0.33%	2:00 PM - 3:00 PM	6.96%
3:00 AM - 4:00 AM	0.33%	3:00 PM - 4:00 PM	7.58%
4:00 AM - 5:00 AM	0.75%	4:00 PM - 5:00 PM	8.08%
5:00 AM - 6:00 AM	2.27%	5:00 PM - 6:00 PM	8.25%
6:00 AM - 7:00 AM	4.60%	6:00 PM - 7:00 PM	7.11%
7:00 AM - 8:00 AM	6.66%	7:00 PM - 8:00 PM	5.12%
8:00 AM - 9:00 AM	5.97%	8:00 PM - 9:00 PM	3.82%
9:00 AM - 10:00 AM	4.80%	9:00 PM - 10:00 PM	3.11%
10:00 AM - 11:00 AM	4.73%	10:00 PM - 11:00 PM	2.21%
11:00 AM - Noon	5.21%	11:00 PM - Midnight	1.58%

55%/45% split recommended for two left turn lanes in the Los Angeles County CMP analyses.

5) As mentioned earlier, a three second per train car crossing rate was used based on the 85th percentile rate observed. The resulting three minute crossing time for the 60 car project train is also utilized in the formula.

The "Average Delay" formula is relatively complex; however, it leads to the development of a graph which should be more easily comprehended. Figure 2 presents a graph which results from the formula and is specific for the proposed project trains (60 cars in length).

In the graph, if the peak hour volume (based on the daily volumes, any peak hour can be found by using the percentages in Table 4) and the number of roadway lanes are known, the average delay is generally between 4.50 and 6.50 seconds per vehicle for most volume and roadway conditions. For most practical purposes, the average delay will remain below 6.00 seconds per vehicle for the planned 8:00 PM to 6:00 AM operations. The 6.00 seconds average delay maximum for the study period relates to a maximum of about 25,000 vehicles per day on a two lane roadway, 41,450 vehicles per day on a four lane roadway, and 62,000 vehicles per day on a six lane roadway (based upon the peak 8:00 - 9:00 PM traffic hour).

In order to provide some perspective as to the potential impacts of the project trains, the Highway Capacity Manual[1] (HCM) was referenced. Table 9-1 of the HCM relates stopped delay per peak hour vehicle, at signalized intersections, to Level of Service (LOS). The LOS ranges from A to F and it is generally accepted that LOS A through D represent acceptable operations, while LOS E and F are considered over capacity. Appendix B contains the relationship of intersection stopped delay to LOS and an explanation of LOS as it relates to a signalized intersection.

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[1] Highway Capacity Manual, Special Report; Transportation Research Board (TRB); 1985.

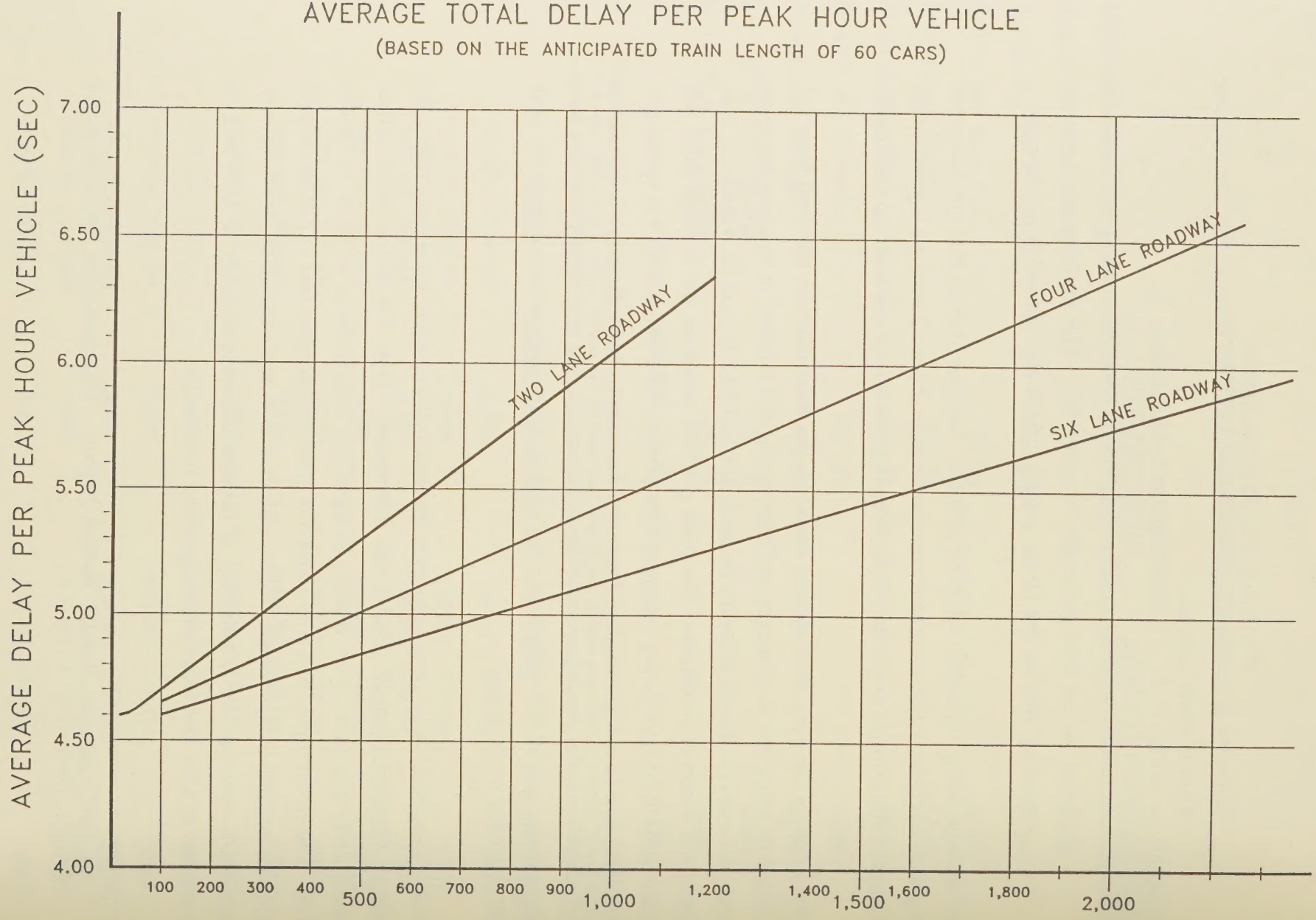

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FIGURE 2

Although a railroad crossing is different from a signalized intersection, the stopped delay per peak hour vehicle and resulting LOS should be generally comparable, since the LOS is based on measurement of driver satisfaction. The LOS criteria in Appendix B shows that the maximum stopped vehicle delay for LOS D conditions would be 40 seconds per peak hour vehicle.

If this is related to the proposed project trains, it can be seen that it would take about 6.5 trains per hour, of 60 cars in length, to reach maximum LOS D conditions during the peak traffic times within the project operations. It should also be remembered that this is based on a very conservative analysis, so the actual capacity could be higher. This hourly train capacity relates to the proposed maximum of 14 trains (7 In, 7 Out) per day which would operate over a ten hour period (the majority during late night, low traffic periods).

If the hourly capacity is extrapolated to a daily maximum, it would result in a total of 156 trains. It should be noted that this is a theoretical capacity and does not consider the physical restraints of actually operating this number of trains. Obviously, if this number of total trains were actually operating, there would be more during some hours and less during others; however, this does provide an overview of the relative number of trains required to reach daily capacity conditions. Again, this can be compared to the projected maximum of 14 trains.

Another comparison which serves to provide perspective of the delay impacts on traffic as a result of the project train, is to examine the potential traffic delays due to a traffic signal. At a signalized intersection, depending on the split of traffic in each direction, traffic would be stopped on one of the streets for an average of 40 to 60 percent of the time. If a signal is assumed to be red 40 percent of the time, traffic would be stopped for 576 minutes every day.

This compares to the project trains which would stop traffic for a total of 42 minutes at peak operations, if the projected 14 trains (7 In, 7 Out) all operated on the same tracks.

Only east of Barstow will all trains operate on the same tracks; and in this section, the traffic volumes are generally lower, which results in a higher train carring capacity.

Overall, the discussions provided above show that the impacts of the project related trains on the traffic crossing the railroad tracks are relatively minor. Given the number, length, time, and speed of trains, as well as the street traffic conditions required to generate significant cumulative impacts, it is not anticipated that project related trains will have a significant impact. This evaluation considers that the analyses performed contained various "worst case" assumptions.

Buildout Traffic

Based on comments received, it was requested that buildout traffic volumes on the study streets be provided, as available. Contact was made with the various county agencies to obtain buildout information. In addition, as the various counties were being contacted, inquiries were made regarding buildout information to determine if local data were available.

San Bernardino County Staff indicated that a growth rate of 4.7 percent per year should be utilized. We were informed that a 20 year time frame should be used to represent buildout conditions. Therefore, if the 4.7 percent per year growth rate is compounded over 20 years, existing volumes will need to be multiplied by 2.506 to obtain buildout volumes.

Riverside County was contacted; however, they did not have any buildout information available. It was recommended that the City of Riverside be contacted and that their methodology be used, since many of the study locations are within the City. City Staff indicated that they utilize a 2.5 percent per year growth rate. If this rate is compounded over 20 years, the multiplication factor would be 1.639 to obtain buildout volumes.

Los Angeles County also provided a growth factor for utilization in the analyses. Since the majority of the study areas within this county are essentially builtout, a lower rate of

0.5 percent per year was recommended. If this rate is compounded over 20 years, the existing volumes would be multiplied by 1.105 to obtain buildout volumes.

Orange County has a traffic model which they use to provide buildout traffic volumes for various roadways in the County. We submitted a list of our study locations in Orange County and we were provided with buildout traffic volumes for the locations for which data were available.

The Orange County buildout volumes and any city specific buildout data received are reflected in the tables in Appendix B. It is assumed that the city specific volumes would be more applicable to their particular area and would, therefore, supersede the general County growth rates. For locations where specific buildout volumes are not available, the rates described above can be applied.

AIR QUALITY SUPPORT DATA

In order to complete the air quality analysis, we were requested to provide traffic delay information. The delay calculations are based upon the same assumptions presented in the "Traffic Analyses" section; however, the results are presented in a different format. Table 5 lists the time delay per vehicle stopped by the train, for different ranges of daily traffic volumes, for both the 8:00 - 9:00 PM and 10:00 - 11:00 PM hours.

Daily traffic volume ranges for streets crossing the tracks were assumed at 10,000 vehicle intervals. Then, for purposes of these analyses, the highest daily volume of each range was selected for use. Given the daily volumes, the peak hour volumes were calculated using the peak hour conversion percentages presented in Table 4 earlier. The peak hour volumes were then used to find the average number of vehicles which would actually be stopped by a project related train.

The peak hour volumes were applied to Figure 2, which resulted in an average delay per peak hour vehicle for two, four, and six lane roadways. Table 5 shows the methodology for converting "Average Delay" to "Delay Per Stopped Vehicle" and the findings are also listed.

TABLE 5

AIR QUALITY
TRAFFIC DELAY DATA
(8:00 PM - 9:00 PM)

DAILY VOLUME RANGE	ANALYSES DAILY VOLUME USED	PEAK HOUR 8:00 PM - 9:00 PM TOTAL VOLUME[a]	VEHICLES STOPPED BY PROJECT TRAIN[b]	DELAY PER STOPPED VEHICLE (SEC.)[c] TWO LANE	FOUR LANE	SIX LANE
0 - 10,000	10,000	380	19	102	98	95
10,000 - 20,000	20,000	760	38	114	104	100
20,000 - 30,000	30,000	1,135	57	125	111	104
30,000 - 40,000	40,000	1,515	76	-----	118	109
40,000 - 50,000	50,000	1,895	95	-----	125	114
50,000 - 60,000	60,000	2,275	114	-----	132	118

(a) Total Peak Hour Volume (Rounded to nearest 5) = Daily Volume X Peak Hour Percentage (Table 4)

(b) Vehicles Stopped By Project Train = $\frac{3}{60}$ X Peak Hour Volume (Total)

(c) Delay Per Stopped Vehicle = (Stopped Delay Per Peak Hour Vehicle (Figure 2) X Peak Hour Volume) + Vehicles Stopped By Train

AIR QUALITY
TRAFFIC DELAY DATA
(10:00 PM - 11:00 PM)

DAILY VOLUME RANGE	ANALYSES DAILY VOLUME USED	PEAK HOUR 10:00 PM - 11:00 PM TOTAL VOLUME[a]	VEHICLES STOPPED BY PROJECT TRAIN[b]	DELAY PER STOPPED VEHICLE (SEC.)[c] TWO LANE	FOUR LANE	SIX LANE
0 - 10,000	10,000	221	11	98	95	94
10,000 - 20,000	20,000	442	22	105	99	97
20,000 - 30,000	30,000	663	33	111	103	99
30,000 - 40,000	40,000	884	44	-----	107	102
40,000 - 50,000	50,000	1,105	55	-----	112	105
50,000 - 60,000	60,000	1,326	66	-----	116	107

(a) Total Peak Hour Volume (Rounded to nearest 5) = Daily Volume X Peak Hour Percentage (Table 4)

(b) Vehicles Stopped By Project Train = $\frac{3}{60}$ X Peak Hour Volume (Total)

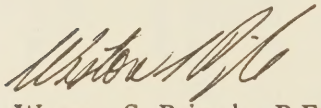
(c) Delay Per Stopped Vehicle = (Stopped Delay Per Peak Hour Vehicle (Figure 2) X Peak Hour Volume) + Vehicles Stopped By Train

Two general trends are noted from Table 5; as the daily traffic volumes increase, the delay per stopped vehicle also increases; and as the number of roadway lanes increases, the delay per stopped vehicle decreases. These trends are expected as the longer vehicle queues (higher volumes) should result in longer times (per vehicle) to clear. Also, if there are more lanes available to traffic, there would be shorter queues and, subsequently, shorter delays per stopped vehicle.

* * * * * * *

We trust that this study will be of assistance to you. If you have any questions or comments, please contact us.

Respectfully submitted,
WPA TRAFFIC ENGINEERING, INC.



Weston S. Pringle, P.E.
Registered Professional Engineer
State of California Numbers C16828 & TR565

WSP:SS
#930560

APPENDIX A

EXISTING & BUILDOUT

DAILY TRAFFIC VOLUMES

				DATA			BUILDOUT	
STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	ADT	YEAR	SOURCE	ADT	SOURCE
BOLO STATION TO BARSTOW								
Saltus Rd.		1-R	62	90	'88	S.B. Co.		
National Trails Hwy.		9	345	590	'90	"		
National Trails Hwy.		9	234					
Bagdad Chase Rd.		1-R	50	70	'90	S.C. Co.		
National Trails Hwy.		9	116					
Newberry Rd.		9	680					
Mt. View Rd.		9	163					
Mineola Rd.		9	211	770	'90	S.B. Co		
Hidden Springs Rd.		9	300					
Daggett Yermo Rd.		9	2,100	3,300	'91	S.B. Co.		
Average:			426					
BARSTOW TO SAN BERNARDINO/KERN COUNTY LINE								
St. Hwy. 58		9-A	7,900					
Mt. View Rd.		9	46	270	'87	S.B. Co.		
Hinkley Rd.		9	600	1,200	'89	"		
Almeda St.		1-R	81					
Harper Lake Rd.		1-R	80	350	'92	S.B. Co.		
U.S. Hwy. 395		9-A	2,450	7,000	'91	"		
St. Hwy. 58		9	5,400	9,600	'91	"		
Average:			2,365					
BARSTOW TO VICTORVILLE								
Lenwood Rd.		9	3,370	7,500	'89	S.B. Co.		
Oak Grove Rd.		1-R	NA					
Hinkley Rd.		9	300	510	'89	S.B. Co.		
Indian Trail Rd.		9	100	310	'89	"		
Vista St.		9	980	4,200	'89	"		
Turner Rd.		1-R	30	70	'90	"		
North Bryman Rd.		1-R	100					
South Bryman Rd.		1-R	200					
Robinson Ranch Rd.		1-R	100					
First St.		9	1,000	700	'90	S.B. Co.		
Sixth St.		9	4,000	2,173	'93	WRA		
Average:			925					
VICTORVILLE TO SAN BERNARDINO								
Swarthout Canyon Rd.		9	100	120	'88	S.B. Co.		
Devore Rd.		9	610	890	'89	"		
Palm Ave.		9	1,322					
St. College Pkwy.		9	9,428	9400	'90	S.B. Co.		
Average:			2,865					
SAN BERNARDINO TO SAN BERNARDINO/LOS ANGELES COUNTY LINE								
Rancho Ave.		9	9,900	4,567	'93	WRA		
Rialto Ave.		9	8,000	8,811	'93	WRA		
Pepper Ave.		9-A	8,800					
Eucalyptus Ave.		9	2,000	2,800		RIALTO		

STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	DATA ADT	YEAR	SOURCE	ADT	SOURCE
Acacia St.		9	3,000	4,200		RIALTO		
Sycamore Ave.		9	1,800	6,800		"		
Riverside Ave.		9	12,000	21,200		"		
Willow Ave.		9	2,000	8,800		"		
Lilac Ave.		9	1,700	7,300		"		
Cactus Ave.		9	2,970	8,600		"		
Cedar Ave.		8, 9	1,200	8,100		"		
Locust Ave.		9	3,100	8,700		FONTANA		
Alder Ave.		9	5,100	11,100		"	23,000	FONTANA
Palmetto Ave.		9	3,000	7,600		"		
Mongo Ave.		9	4,600	7,400		"		
Sierra Ave.		8, 9	15,800	25,300		"	33,000	FONTANA
Juniper Ave.		9	5,200	14,100		"		
Citrus Ave.		9	4,600	16,600		"	27,000	FONTANA
Beach Ave. BEECH		9	1,700	7,100		"	19,000	"
Etiwanda Ave.		9	4,820	14,200		"	19,000	"
Rochester Ave.		9	700	4,000	'90	RANCHO CUCAMONGA	42,000	RANCHO CUCAMONGA
Haven Ave.		9	8,200	35,600	'92	"	68,000	"
Turner Ave. HERMOSA		9	600	7,000	'91	"	13,000	"
Archibald Ave.		9	9,000	30,500	'91	"	35,000	"
Hellman Ave.		9	1,000	6,500	'90	"	16,000	"
Vineyard Ave.		9	9,000	23,600	'90	"	35,000	"
Baker Ave.		9	1,800				10,000	"
Grove Ave.		9-A	9,900	15,900	'90	"	30,000	"
Campus Ave.		9	6,400	9,000	'89	UPLAND		
Sultana Ave.		9	2,500					
Euclid Ave.		9	30,000	35,000	'91	UPLAND		
San Antonio Ave.		9	6,910	12,400	'91	"		
Mountain Ave.		8, 9	14,600	36,000	'87	"		
Benson Ave.		9	3,600	10,300	'87	"		
Central Ave.		9	12,000	22,600	'91	"		
Claremont Ave.		9	2,952					
College Ave.		9	1,817	10,000	'89	CLAREMONT		
Indian Hill Blvd.		8, 9	9,500	26,600	'93	"		
Average:			6,099					
SAN BERNARDINO TO SAN BERNARDINO/RIVERSIDE COUNTY LINE								
Rialto Ave.		9	12,900					
Walnut St.		9	500	2,000	'91	S.B		
Mill St. (Old)		9	1,000					
Laurel St.		9	1,600	6,500		COLTON		
Olive St.		9	1,900	6,700		"		
E St.		9	500	10,000		"		
H St.		9	1,600	3,900		"		
Valley Blvd.		9	7,500	11,000		"		
Main St.		1-R, 9	3,490					
Average:			3,443					
SAN BERNARDINO/LOS ANGELES COUNTY LINE, WORKING WEST								

				DIFFERENTIAL DATA			GLENDORA	
STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	ADT	YEAR	SOURCE	ADT	SOURCE
College Ave.	2-104.7	9	1,817	10,000	'89	CLAREMONT		
Indian Hill Blvd	2-104.9	9	9,500	26,600	'93	"		
Cambridge Ave	2-105.4	9	NA	2,600	'91	"		
Towne Ave	2-105.9	9	7,961	25,500	'92	Pomona		
Gary Ave	2-106.6	9	11,700	23,500	'92	"		
Fulton Road	2-107.1	9	178	950	'90	LA VERNE		
White Ave	2-107.5	9	9,103	15,500	'90	"		
"E" Street	2-107.9	9	3,127	6,400	'90	"		
"D" Street	2-108.0	9	1,477	8,000	'90	"		
"A" Street	2-108.3	9	1,295	560	'90	"		
San Dimas Canyon Road	2-109.3	9	577	6,400	'88	SAN DIMAS		
Walnut Ave	2-109.8	9	2,600	2,600	'88	"		
San Dimas Ave	2-110.1	9	3,000	8,200	'88	"		
Monte Vista Ave	2-110.2	9	983	1,300	'88	"		
Cataract Ave	2-110.3	9	7,000	2,500	'88	"		
Eucla Ave	2-110.6	9	784	6,900	'88	"		
210 Fwy	2-111.1	Overpass	NA					
Gladstone Ave	2-111.4	9	3,000	6,900	'88	"		
Lone Hill Ave	2-111.7	9	2,100	17,200	'92	Glendora		
210 Fwy	2-112.0-A	Overpass	NA	—				
Foothill Blvd	2-112.5-B	Underpass	NA	—				
Loraine Ave	2-113.2	9	3,500	4,400	'91	Glendora		
Elwood Ave	2-113.4	9	750					
Glenwood Ave	2-113.6	9	750					
Pasadena Ave	2-114.0	9	500					
Glendora Ave	2-114.2	9	7,373	16,500	'92	Glendora		
Vermont Ave	2-114.4	9	1,200	4,100	'87	"		
Foothill Blvd	2-114.8	9	22,000 *	14,200	'91	"		
Grand Ave	2-114.8	9	22,000 *	16,400	'91	"		
Barranca Ave	2-115.4	9	5,400	9,000	'91	"		
Pasadena Ave	2-116.6	9	2,976	3,600	'91	AZUSA		
Dalton Ave	2-116.7	9	615					
Alameda Ave	2-116.8	9	900					
Azusa Ave	2-116.9	9	6,100	8,800	'91	CALTRANS		
San Gaberial Ave	2-117.0	9	6,100	9,000	'91	"		
Foothill Blvd	2-117.3-B	Underpass	NA					
Virginia Ave	2-117.6	9	4,732					
210 Fwy	2-117.9-B	Underpass	NA					
Irwindale Ave	2-118.5-A	Overpass	NA					
605 Fwy	2-119.91-A	Overpass	NA					
Fwy Ramp	2-119.93-A	Overpass	NA					
605 Fwy	2-119.96-A	Overpass	NA					
Fwy Ramp	2-119.97-A	Overpass	NA					
Fwy Ramp	2-120.0-A	Overpass	NA					
Highland Ave	2-120.4	9	5,000	8,600	'89	DUARTE		

* RxR CROSSES AT INTERSECTION. NUMBERS INDICATED ADT AT NB/SB OR EB/WB DIRECTION

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STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	SUPPLEMENTAL DATA ADT	YEAR	SOURCE	CALTRANS ADT	SOURCE
Buena Vista Ave	2-121.0	9	8,300	12,000	'89	DUARTE		
Mountain Ave	2-121.5	9	8,900	11,600	'89	DUARTE		
California Ave	2-122.1	9	6,877	7,000	'81	MONROVIA		
Myrtle Ave	2-122.4	9	13,953	17,250	'81	"		
Magnolia Ave	2-122.6	9	4,504	4,000	'81	"		
Mayflower Ave	2-122.9	9	8,727	8,700	'81	"		
Huntington Dr.	123.8-B	Underpass	NA					
First Ave	2-124.1	9	11,200	9,700	'89	ARCADIA		
Santa Clara St	2-124.1	9	11,200	4,100	'89	"		
Santa Anita Ave	2-124.3	9	15,451	31,900	'89	"		
Colorado Blvd	2-124.5	Underpass	NA					
210 Fwy	2-124.9-B	Underpass	NA					
Baldwin Ave	2-125.5-B	Underpass	NA					
Michilinda Ave	2-126.5-B	Underpass	NA					
Rosemead Blvd	2-126.8-B	Underpass	NA					
Sierra Madre Villa	2-127.3-B	Underpass	NA					
Foothill Blvd	2-127.7-B	Underpass	NA					
Sunnyslope Ave	2-127.9-B	Underpass	NA					
San Gaberial Blvd	2-128.2-B	Underpass	NA					
Sierra Madre Blvd	2-128.2-B	Underpass	NA					
Altadena Dr	2-128.4-B	Underpass	NA					
Craig Ave	2-128.8-B	Underpass	NA					
Allen Ave	2-129.2-B	Underpass	NA					
Sierra Bonita Ave	2-129.4-B	Underpass	NA					
Hill Ave	2-129.7-B	Underpass	NA					
Wilson Ave	2-130.1-A	Overpass	NA					
Lake Ave	2-130.3-A	Overpass	NA					
El Molino Ave	2-130.6-A	Overpass	NA					
Los Robles Ave	2-130.8-A	Overpass	NA					
Marengo Ave	2-131.1-A	Overpass	NA					
Walnut St.	2-131.12-A	Overpass	NA					
Holly St	2-131.2	9	9,574					
Union St	2-131.3	9	1,690	5,100	'93	PASADENA		
Colorado Blvd	2-131.4	9	17,600	14,300	'93	"		
Green St	2-131.5	9	11,639	5,200	'93	"		
Del Mar Blvd	2-131.8	9	8,010	19,600	'92	"		
Bellvue Dr	2-131.9	9	1,500	1,400	'90	"		
California St.	2-132.1	9	14,500	21,600	'90	"		
Filmore St.	2-132.3	9	1,320					
Glenarm St.	2-132.5	9	8,268	16,800	'89	"		
State St	2-132.8	9	906	410	'89	"		
Fair Oaks	2-132.9-A	Overpass	NA					
Columbia St.	2-133.0-A	Overpass	NA					
Oaklawn	2-133.2-A	Overpass	NA					
Pasadena Fwy	2-133.3-B	Underpass	NA					

				SUPPLEMENTAL DATA			BALANCE	
STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	ADT	YEAR	SOURCE	ADT	SOURCE
Fremont Ave	2-133.4	9	11,000					
Grevelia St	2-133.4	9	11,000					
Magnolia St	2-133.45	9	386					
Fairview Ave	2-133.5	9	203					
Hope St	2-133.6	9	503					
Meridian Ave	2-133.7	9	13,627					
Mission St.	2-133.7	9	13,627					
El Centro St	2-133.8	9	2,563					
Orange Grove Ave	2-134.0	9	474					
Indiana Ave	2-134.2	9	678					
Pasadena Ave	2-134.5	9	3,725					
Monterey Rd	2-134.51	9	NA					
Sycamore Ave	2-134.8	9	911					
Arroyo Verde Rd	2-134.8	9	911					
Pasadena Fwy	2-135.3-B	Underpass	NA					
Figuroa St	2-135.5	9	15,700	9,600	'92	CITY OF LOS ANGELES		
Ave 61	2-135.6	9	2,258	3,300	'92	"		
Ave 60	2-135.7	9	1,155					
Ave 59	2-135.8	9	1,513	20,500	'92	"		
Ave 58	2-135.85	9	1,042					
Ave 57	2-135.9	9	1,904					
Ave 56	2-136.0	9	2,970	7,200	'92	"		
Ave 55	2-136.1	9	1,012					
Ave 54	2-136.2	9	2,184					
Ave 53	2-136.3	9	839	8,800	'92	"		
Ave 52	2-136.4	9	4,589					
Ave 51	2-136.45	9	806					
Ave 50	2-136.5	9	6,631					
Ave 45	2-137.3	9	3,265					
Figuroa St	2-137.7	9	12,724	16,900	'92	"		
Marmion Way	2-137.8	9	NA					
French Ave	2-138.0	9	2,000					
Pasadena Fwy	2-138.1-B	Underpass	NA					
Ave 33	2-138.3	9	2,043					
Ave 26	2-138.6-B	Underpass	NA					
Golden State Fwy	2-138.7-B	Underpass	NA					
San Fernando Road	2-138.9-B	Underpass	NA					
Ave 19	2-139.0-B	Underpass	NA					
N. Broadway	2-139.3-A	Overpass	NA					
N. Spring St	2-139.5-A	Overpass	NA					
N. Main St	2-139.6	9	10,897					
Average:			3,461					
RIVERSIDE COUNTY LINE, WORKING WEST								
Main St	2B-6.4	9	1,000	2,800	'91	RIV. CO.		
Center St	2B-6.7	9	3,500	5,000	'91	"		

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STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	SUPPLEMENTAL DATA ADT	YEAR	SOURCE	CALTRANS ADT	CALTRANS SOURCE
Iowa St	2B-7.3	9	7,840					
Palmyrita Ave	2B-7.6	9	750	1,300	'86	CITY OF RIVERSIDE		
Colombia Ave	2B-7.9	9	5,470	9,700	'94	"		
Marlborough Ave	2B-8.2	9	518	1,700	'89	"		
I 215 Fwy	2B-8.7-A	Overpass	NA					
Spruce St	2B-8.8	9	1,883	4,800	'86	"		
Kansas Ave	2B-8.9	9	5,024	4,500	'96	"		
3rd St	2B-9.5	9	5,040	9,700	'86	"		
7th St	2B-9.75	9	2,660	4,100	'89	"		
University	2B-9.91-B	Underpass	NA					
10th St	2B-10.05	9	930					
12th Ave	2B-10.2	9						
14th St	2B-10.3-B	Underpass	NA					
Prospect Ave	2B-10.55	9	3,170					
Cridge St	2B-10.7	9	4,100	6,500	'90	CITY OF RIVERSIDE		
Ivy St	2B-11.3-A	Overpass	NA					
Central Ave	2B-11.8-B	Underpass	NA					
Arlington Ave	2B-12.4	9	13,100	32,603	'93	WRA		
Jane St	2B-12.7	9	1,540	3,300	'89	CITY OF RIVERSIDE		
Mary St	2B-13.0	9	4,900	10,800	'91	"		
Washington St	2B-13.2	9	5,356	5,700	'92	"		
Madison St	2B-13.7	9	7,500	8,900	'91	"		
Jefferson St	2B-14.3	9	1,864	8,000	'89	"		
Adams St	2B-14.8	1r	2,000	11,300	'93	WRA		
Monroe St	2B-15.3-B	Underpass	NA					
Jackson St	2B-15.8	1r	499	6,700	'93	WRA		
Gibson St	2B-16.1	9	360					
Van Buren Blvd	2B-16.4-B	Underpass	NA					
Harrison St	2B-16.9	9	1,950					
Tyler St	2B-17.4	9	1,380					
La Serria Ave	2B-18.5-A	Overpass	NA					
Filmore St	2B-19.0	1r	NA					
Pierce St	2B-19.6	9	820					
Buchanan St	2B-20.1	9	190					
Magnolia Ave	2B-20.3	9	11,765	15,600	'93	CITY OF RIVERSIDE		
Mckinley St	2B-21.2	9	6,550	20,500	'91	CITY OF CORONA		
Parkridge Ave	2B-22.8	9	228					
I 15 Fwy	2B-22.9-A	Overpass	NA					
State Rt 91 Fwy	2B-23.5-A	Overpass	NA					
Joy St	2B-23.9	9	2,054					
Main St	2B-24.1-A	Overpass	NA					
Sheridan St	2B-24.3	9	1,013					
Cota St	2B-24.5	9	1,097					
Lincoln Ave	2B-25.1-A	Overpass	NA					
Railroad St	2B-25.6	1r	NA	10,000	'92	CITY OF CORONA		
Smith St	2B-25.8	9	1,726	12,000	'92	"		
Serfas Club Dr	2B-27.2	9	NA					
State Rt 91 Fwy	2B-27.9-A	Overpass	NA					
State Rt 91 Fwy	2B-29.54-A	Overpass	NA					

				SUPPLEMENTAL DATA			BUILDOUT	
STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	ADT	YEAR	SOURCE	ADT	SOURCE
Crestridge Dr	2B-29.8-A	Overpass	NA					
Average:			2,113					
WEST RIVERSIDE COUNTY LINE BEGIN ORANGE COUNTY								
Camino De Bryan	2B-32.7-b	Underpass	NA					
Via Lomas De Yorba Eas	2B-???	Overpass	NA					
Via Lomas De Yorba Eas	2B-34.5-B	Underpass	NA					
Weir Canyon Road	2B-35.9-A	Overpass	NA					
Imperial Hwy	2B-38.4	9	14,000	42,000	'92	CO. OF ORANGE	87,000	CO. OF ORANGE
Kellogg Dr	2B-39.2	9	NA	7,000	'92	"	8,000	"
Lakeview Ave	2B-39.9	9	1,000	22,000	'92	"	37,000	"
Richfield Rd	2B-40.4	9	3,000	5,000		"	15,000	"
Van Buren St	2B-40.7	9	2,000					
Jefferson St	2B-41.0	9	4,000	4,000		"	9,000	"
Tustin Ave	2B-41.5	9	6,000	21,000		"	37,000	"
Orangethorpe Ave	2B-41.8	9	8,000	26,000		"	50,000	"
Kramer Blvd	2B-42.5	9	9,000	23,000		"	44,000	"
Bradford Ave	2B-43.0	9	4,000	5,000		"	11,000	"
Melrose St	2B-43.1	9	3,000	5,000		"	9,000	"
State Rt 57 Fwy	2B-43.4-A	Overpass	NA					
Placentia Ave	2B-43.6	9	10,000	16,735	'93	WFA	28,000	"
State College Blvd	2B-44.0	9	27,000	20,168	'93	WFA	32,000	"
Acacia St	2B-44.5	9	5,000	7,000		CO. OF ORA...	13,000	"
Raymond Ave	2B-45.0	9	14,950	21,000		"	27,000	"
Lemon St	2-165.2-B	Underpass	NA					
Harbor Blvd	2-164.9-B	Underpass	NA					
Highland Ave	2-164.7	9	8,400	7,000		"	8,000	"
Euclid Ave	2-163.9-B	Underpass	NA					
Commonwealth Ave	2-163.3-B	Underpass	15,000	16,000		"	23,000	"
Brookhurst Rd	2-162.9	9	NA	23,000		"	25,000	"
North Gilbert Ave	2-162.4	Underpass	NA					
Dale St	2-161.3	9	12,000					
Average:			5,227					
WEST ORANGE COUNTY LINE BEGIN LOS ANGELES COUNTY								
Beach Blvd	2-160.6-B	Underpass	NA					
Alondra Blvd	2-159.6-A	Overpass	NA					
Valley View Ave	2-158.4	9	18,000	34,500	'88	SANTA FE SPRINGS		
Rosecrans Blvd	2-157.8	9	17,000	19,800	'88	"		
Marquardt Ave	2-157.8	9						
Carmenita Rd	2-157.3-B	Underpass	NA					
Imperial Hwy	2-156.1-B	Underpass	NA					
Lakeland Rd	2-155.1	9	4,700	2,600	'88	SANTA FE SPRINGS		
Florence Ave	2-154.9-B	Underpass	NA					
Telegraph Rd	2-154.4-B	Underpass	NA					
Santa Fe Springs Rd	2-154.0-B	Underpass	NA					
Los Nietos Rd	2-153.4	9	NA	7,200	'92	SANTA FE SPRINGS		
Norwalk Blvd	2-153.1	9	17,600	18,900	'92	"		
Pioneer Blvd	2-152.29	9	11,000	12,900	'93	WFA		

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STREET NAME	PUC Crossing Number	CROSSING/ SIGNAL TYPE	ADT	ADT	YEAR	SOURCE	ADT	SOURCE
605 Fwy	2-152.2-A	Overpass	NA					
Slauson Ave	2-151.9-A	Overpass	NA					
Passons Blvd	2-151.45	9	9,300	12,300	'89	PICO RIVERA		
Serapis St	2-151.3	9	4,600	7,300	'89	"		
Rosemead Blvd	2-150.9-B	Underpass	NA					
Paramount Blvd	2-150.4-B	Underpass	NA					
Greenwood Ave	2-149.5-B	Underpass	NA					
Garfield Ave	2-148.78-B	Underpass	NA					
Telegraph Road	2-148.8-B	Underpass	NA					
I 5 Fwy	2-148.7-B	Underpass	NA					
Eastern Ave	2-147.3	Underpass	NA					
Atlantic Blvd	2-146.6-B	Underpass	NA					
Average:			3,288					

APPENDIX B

EXPLANATION OF LEVEL OF SERVICE

LEVEL OF SERVICE CRITERIA

SIGNALIZED INTERSECTIONS:

Level of Service	Stopped Delay Per Vehicle (Sec)
A	≤ 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

LEVEL OF SERVICE (LOS) DESCRIPTIONS

LEVEL OF SERVICE	
A	Low volumes; high speeds; speed not restricted by other vehicles; all signal cycles clear with no vehicles; all signal cycles clear with no vehicles waiting through more than one signal cycle.
B	Operating speeds beginning to be affected by other traffic; between one and ten percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods.
C	Operating speeds and maneuverability closely controlled by other traffic; between 11 and 30 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods; recommended ideal design standard.
D	Tolerable operating speeds; 31 to 70 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during traffic periods; often used as design standard in urban areas.
E	Capacity; the maximum traffic volumes an intersection can accommodate; restricted speeds; 71 to 100 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods.
F	Long queues of traffic; unstable flow; stoppages of long duration; traffic volume and traffic speed can drop to zero; traffic volume will be less than the volume which occurs at Level of Service E.

APPENDIX G
NOISE CALCULATIONS

TABLE H.1
CNEL WORKSHEET FOR LINE OPERATIONS
1994 CONDITIONS WITHOUT RAIL•CYCLE

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
a olo Station/ rstow il•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
b olo Station/ rstow ssenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
c olo Station/ rstow ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	398	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 55	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 11	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 31	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
mposite CNEL																						80	76	70	67	64	62
a rstow/ a Clarita il•Cycle	San Bernardino Kern Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
b rstow/ a Clarita senger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	0	0						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		0						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 0	0						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	0						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 0	0						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		0						
c rstow/ a Clarita ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	70	73						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		69						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 8	63						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 4	59						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 5	57						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		54						
mposite CNEL																						73	69	63	59	57	54
a rstow/ ctorville il•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
b rstow/ ctorville senger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
c rstow/ ctorville ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
mposite CNEL																						80	76	70	66	64	61

TABLE H.1 (CONTINUED)
CNEL WORKSHEET FOR LINE OPERATIONS
1994 CONDITIONS WITHOUT RAIL•CYCLE

Train Category dentification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
storville/SB •Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
storville/SB senger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
storville/SB ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
posite CNEL																						80	76	70	66	64	61
Irwindale •Cycle	San Bernardino Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
Irwindale senger		480	65	NA	None	100'	5.0	7.0	86.3	0.0	0.0	0.0	93.3	96.0	0.0	0.0	NA	96.0	97.9	40	64						
						200'				4.0	0.0	0.0	89.3		4.0	0.0		92.0	93.9		60						
						400'				10.0	0.0	0.0	83.3		10.0	0.0		86.0	87.9	day = 11	54						
						600'				14.0	0.0	0.0	79.3		12.0	0.0		84.0	85.3	eve = 3	52						
						800'				16.0	0.0	0.0	77.3		16.0	0.0		80.0	81.9	night = 2	48						
						1200'				19.5	0.0	0.0	73.8		16.5	0.0		79.5	80.5		47						
Irwindale ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	0	0						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		0						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 0	0						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 0	0						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 0	0						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		0						
posite CNEL																						64	60	54	52	48	47
Commerce •Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
Commerce senger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	34	64						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		60						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 8	54						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 2	51						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	48						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		47						
Commerce ight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
posite CNEL																						80	76	70	66	64	61

TABLE H.2
CNEL WORKSHEET FOR LINE OPERATIONS
1994 CONDITIONS WITH RAIL•CYCLE AT 3,000 TPD

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
La Bolo Station/ Barstow Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	20	66						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		62						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	56						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	53						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 2	50						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		48						
Lb Bolo Station/ Barstow Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
Lc Bolo Station/ Barstow Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	398	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 55	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 11	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 31	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						80	76	70	67	64	62
La Barstow/ Santa Clarita Rail•Cycle	San Bernardino Kern Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
Lb Barstow/ Santa Clarita Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	0	0						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		0						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 0	0						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	0						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 0	0						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		0						
Lc Barstow/ Santa Clarita Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	70	73						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		69						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 8	63						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 4	59						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 5	57						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		54						
Composite CNEL																						73	69	63	59	57	54
La Barstow/ Victorville Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	20	66						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		62						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	56						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	53						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 2	50						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		48						
Lb Barstow/ Victorville Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
Lc Barstow/ Victorville Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
Composite CNEL																						80	76	70	66	64	61

TABLE H.2 (CONTINUED)
CNEL WORKSHEET FOR LINE OPERATIONS
1994 CONDITIONS WITH RAIL•CYCLE AT 3,000 TPD

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
a ictorville/SB il•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	20	66						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		62						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	56						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	53						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 2	50						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		48						
b ictorville/SB ssenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
c ictorville/SB eight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
mposite CNEL																						80	76	70	66	64	61
a B/Irwindale il•Cycle	San Bernardino Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
b B/Irwindale ssenger		480	65	NA	None	100'	5.0	7.0	86.3	0.0	0.0	0.0	93.3	96.0	0.0	0.0	NA	96.0	97.9	40	64						
						200'				4.0	0.0	0.0	89.3		4.0	0.0		92.0	93.9		60						
						400'				10.0	0.0	0.0	83.3		10.0	0.0		86.0	87.9	day = 11	54						
						600'				14.0	0.0	0.0	79.3		12.0	0.0		84.0	85.3	eve = 3	52						
						800'				16.0	0.0	0.0	77.3		16.0	0.0		80.0	81.9	night = 2	48						
						1200'				19.5	0.0	0.0	73.8		16.5	0.0		79.5	80.5		47						
c B/Irwindale eight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	0	0						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		0						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 0	0						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 0	0						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 0	0						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		0						
mposite CNEL																						64	60	54	52	48	47
a B/Commerce il•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	20	66						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		62						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	56						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	53						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 2	50						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		48						
b B/Commerce assenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	34	64						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		60						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 8	54						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 2	51						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	48						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		47						
c B/Commerce eight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	333	80						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		76						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 52	70						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 7	66						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 26	64						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		61						
mposite CNEL																						80	76	70	66	64	61

TABLE H.3
CNEL WORKSHEET FOR LINE OPERATIONS
1998 CONDITIONS WITHOUT RAIL•CYCLE

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
1.a Bolo Station/ Barstow Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
1.b Bolo Station/ Barstow Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
1.c Bolo Station/ Barstow Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	528	82						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		78						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 73	72						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 15	68						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 41	66						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		63						
Composite CNEL																						82	78	72	68	66	63
2.a Barstow/ Santa Clarita Rail•Cycle	San Bernardino Kern Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
2.b Barstow/ Santa Clarita Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	0	0						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		0						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 0	0						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	0						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 0	0						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		0						
2.c Barstow/ Santa Clarita Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	106	75						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		71						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 11	65						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 5	61						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 8	59						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		56						
Composite CNEL																						75	71	65	61	59	56
3.a Barstow/ Victorville Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
3.b Barstow/ Victorville Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
3.c Barstow/ Victorville Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						81	77	71	67	65	62

TABLE H.3 (CONTINUED)
CNEL WORKSHEET FOR LINE OPERATIONS
1998 CONDITIONS WITHOUT RAIL•CYCLE

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
4.a Victorville/SB Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
4.b Victorville/SB Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
4.c Victorville/SB Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						81	77	71	67	65	62
5.a SB/Irwindale Rail•Cycle	San Bernardino Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
5.b SB/Irwindale Passenger		480	65	NA	None	100'	5.0	7.0	86.3	0.0	0.0	0.0	93.3	96.0	0.0	0.0	NA	96.0	97.9	103	69						
						200'				4.0	0.0	0.0	89.3		4.0	0.0		92.0	93.9		65						
						400'				10.0	0.0	0.0	83.3		10.0	0.0		86.0	87.9	day = 29	59						
						600'				14.0	0.0	0.0	79.3		12.0	0.0		84.0	85.3	eve = 8	56						
						800'				16.0	0.0	0.0	77.3		16.0	0.0		80.0	81.9	night = 5	53						
						1200'				19.5	0.0	0.0	73.8		16.5	0.0		79.5	80.5		51						
5.c SB/Irwindale Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	0	0						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		0						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 0	0						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 0	0						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 0	0						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		0						
Composite CNEL																						69	65	59	56	53	51
6.a SB/Commerce Rail•Cycle	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	0	0						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		0						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	0						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	0						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 0	0						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		0						
6.b SB/Commerce Passenger		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	62	67						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		63						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 13	57						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 3	54						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 4	51						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		49						
6.c SB/Commerce Freight		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						81	77	71	67	65	62

TABLE H.4
CNEL WORKSHEET FOR LINE OPERATIONS
1998 CONDITIONS WITH RAIL•CYCLE AT 21,000 TPD

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
1.a Bolo Station/ Barstow **Rail•Cycle**	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	140	75						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		71						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	65						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	61						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 14	59						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		56						
1.b Bolo Station/ Barstow **Passenger**		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
1.c Bolo Station/ Barstow **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	528	82						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		78						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 73	72						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 15	68						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 41	66						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		63						
Composite CNEL																						83	79	73	69	67	64
2.a Barstow/ Santa Clarita **Rail•Cycle**	San Bernardino Kern Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	20	66						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		62						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	56						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	53						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 2	50						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		48						
2.b Barstow/ Santa Clarita **Passenger**		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	0	0						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		0						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 0	0						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	0						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 0	0						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		0						
2.c Barstow/ Santa Clarita **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	106	75						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		71						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 11	65						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 5	61						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 8	59						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		56						
Composite CNEL																						76	72	66	62	60	57
3.a Barstow/ Victorville **Rail•Cycle**	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	120	74						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		70						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	64						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	61						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 12	58						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		55						
3.b Barstow/ Victorville **Passenger**		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
3.c Barstow/ Victorville **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						82	78	72	68	66	63

TABLE H.4 (CONTINUED)
CNEL WORKSHEET FOR LINE OPERATIONS
1998 CONDITIONS WITH RAIL•CYCLE AT 21,000 TPD

Train Category Identification	County	L, feet (average train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to track, feet	(1) Pass-by Duration sec t=L/V	(2) C1 10 * log(t)	(3) Car SPL at 100' dB C2	(4) Car-distance attenuation α	(5) Car barrier correction α_{bc}	(6) Car Noise Adjustment C3	(7) SENEL Noise (cars), dB C1+C2+C3-α-α_{bc}	(8) Loco. SENEL at 100' C4, dB	(9) Loco. distance attenuation α	(10) Loco. barrier correction α_{be}	(11) Helper engine adjustment, C5	(12) SENEL (loco.), dB C4+C5-α-α_{be}	(13) SENEL (Train) dB	(14) equiv. no. of daily operations n	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCES INDICATED (16) 100'	(17) 200'	(18) 400'	(19) 600'	(20) 800'	(21) 1200'
4.a Victorville/SB **Rail•Cycle**	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	100	73						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		69						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	63						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	60						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 10	57						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		55						
4.b Victorville/SB **Passenger**		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	22	62						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		58						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 2	52						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 0	50						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 2	46						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		45						
4.c Victorville/SB **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						82	78	72	68	66	63
5.a SB/Pasadena **Rail•Cycle**	San Bernardino Los Angeles	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	40	69						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		65						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	59						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	56						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 4	53						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		51						
5.b SB/Pasadena **Passenger**		480	65	NA	None	100'	5.0	7.0	86.3	0.0	0.0	0.0	93.3	96.0	0.0	0.0	NA	96.0	97.9	103	69						
						200'				4.0	0.0	0.0	89.3		4.0	0.0		92.0	93.9		65						
						400'				10.0	0.0	0.0	83.3		10.0	0.0		86.0	87.9	day = 29	59						
						600'				14.0	0.0	0.0	79.3		12.0	0.0		84.0	85.3	eve = 8	56						
						800'				16.0	0.0	0.0	77.3		16.0	0.0		80.0	81.9	night = 5	53						
						1200'				19.5	0.0	0.0	73.8		16.5	0.0		79.5	80.5		51						
5.c SB/Pasadena **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	0	0						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		0						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 0	0						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 0	0						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 0	0						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		0						
Composite CNEL																						72	68	62	59	56	54
6.a SB/Commerce **Rail•Cycle**	San Bernardino	4,000	55	NA	None	100'	49.5	16.9	84.8	0.0	0.0	0.0	101.7	96.0	0.0	0.0	NA	96.0	102.8	40	69						
						200'				4.0	0.0	0.0	97.7		4.0	0.0		92.0	98.8		65						
						400'				10.0	0.0	0.0	91.7		10.0	0.0		86.0	92.8	day = 0	59						
						600'				14.0	0.0	0.0	87.7		12.0	0.0		84.0	89.3	eve = 0	56						
						800'				16.0	0.0	0.0	85.7		16.0	0.0		80.0	86.8	night = 4	53						
						1200'				19.5	0.0	0.0	82.2		16.5	0.0		79.5	84.1		51						
6.b SB/Commerce **Passenger**		480	79	NA	None	100'	4.1	6.2	88.0	0.0	0.0	0.0	94.1	96.0	0.0	0.0	NA	96.0	98.2	62	67						
						200'				4.0	0.0	0.0	90.1		4.0	0.0		92.0	94.2		63						
						400'				10.0	0.0	0.0	84.1		10.0	0.0		86.0	88.2	day = 13	57						
						600'				14.0	0.0	0.0	80.1		12.0	0.0		84.0	85.5	eve = 3	54						
						800'				16.0	0.0	0.0	78.1		16.0	0.0		80.0	82.2	night = 4	51						
						1200'				19.5	0.0	0.0	74.6		16.5	0.0		79.5	80.7		49						
6.c SB/Commerce **Freight**		5,280	55	NA	None	100'	65.3	18.1	84.8	0.0	0.0	0.0	103.0	96.0	0.0	0.0	NA	96.0	103.8	446	81						
						200'				4.0	0.0	0.0	99.0		4.0	0.0		92.0	99.8		77						
						400'				10.0	0.0	0.0	93.0		10.0	0.0		86.0	93.8	day = 69	71						
						600'				14.0	0.0	0.0	89.0		12.0	0.0		84.0	90.2	eve = 9	67						
						800'				16.0	0.0	0.0	87.0		16.0	0.0		80.0	87.8	night = 35	65						
						1200'				19.5	0.0	0.0	83.5		16.5	0.0		79.5	84.9		62						
Composite CNEL																						81	77	71	68	65	63

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